STRUCTURED ANALYSIS/DESIGN

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.6
TRAINING TRADE-OFFS

APJ 966-221

APJ

MILITARY & SCIENTIFIC RESEARCH

AMERICAN POWER JET CO. RIDGEFIELD N.J.

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report consolidates the Structured Analysis and Structured Design for the Logistic Support Analysis (LSA) Tasks. Included are the Data Flow Diagrams (DFDs) for LSA Subtask 303.2.6, "Training Trade-Offs", and the corresponding descriptions of the processes, data flows, data stores, and external entities identifies how to use the data to carry out the processes and accomplish the LSA Subtask. Venture Evaluation Review Technique (VERT) Batch Input files are also provided to assist as tools, giving both technical and managerial aspects of a task.

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AD-A255328 Words/Phrases(4 words max) that match Thesaurus Entries

TEXT	THESAURUS
DIAGRAMS	Diagrams
EXTERNAL	External
FLOW	Flow
INPUT	Input
LOGISTIC	Logistics
STORES	Stores
TOOLS	Tools
TRADE	Commerce
TRAINING	Training

@1@ AD-A255328 92-24
@20@ u
@23@ Commerce, Diagrams, External, Flow, Input, Logistics, Stores, Tools, Training.
@24@ u
@27@ This report consolidates the Structured Analysis and Structured Des-gn for the Logistic Support Analysis (LSA) Tasks. Included are the Data F-ow Diagrams (DFDs) for LSA Subtask 303.2.6, "Training Trade-Offs", and the corresponding descriptions of the processes, data flows, data stores, and external entities identifies how to use the data to carry out the processes and accomplish the LSA Subtask. Venture Evaluation Review Technique (VERT) Batch Input files are also provided to assist as tools, giving both technical and managerial aspects of a task. Structured Analysis, Structured Design, Logistic Support Analysis, LSA, Data Flow Diagrams, DFDs, Processes, Data Flows, Data Stores, External Entities
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APJ 966-221

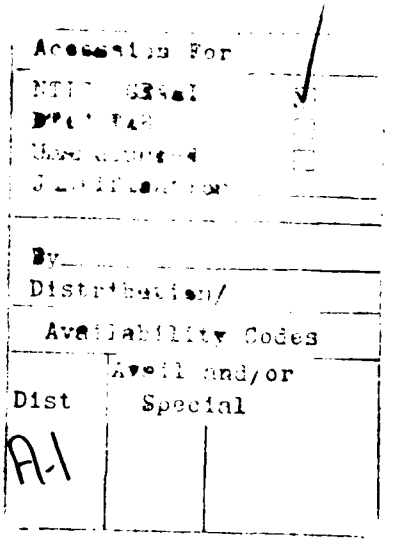
STRUCTURED ANALYSIS/DESIGN

LSA TASK 303

EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS

SUBTASK 303.2.6

TRAINING TRADE-OFFS



under

CONTRACT DAAA21-86-D-0025

for

HQ US AMCCOM
INTEGRATED LOGISTIC SUPPORT OFFICE
AMSMC-LSP
ROCK ISLAND, IL

by

AMERICAN POWER JET COMPANY

RIDGEFIELD, NJ — FALLS CHURCH, VA

WILLIAMSBURG, VA — ST. LOUIS, MO

January 1990

FOREWORD

APJ, under contract to HQs, AMCCOM, has initiated the automation of the LSA Tasks (MIL-STD-1388-1), and the assessment of the ILS elements (AR 700-127). A major goal is to unify military and contractor approach to the performance of ILS and LSA.

Detailed to meet all requirements of ILS and LSA, the automated process will continue to provide the flexibility in selecting tasks and elements to be addressed at each life cycle stage. A major advantage of this approach is to insure that the application of each task is consistent with prescribed Army policies and procedures.

This report consolidates the Structured Analysis and Structured Design under one cover for the respective LSA Tasks. Structured Analysis provides a logical model of the method to perform an LSA Task. This logical model facilitates the development of a Structured Design that provides the detailed procedures to perform the analysis. Both the logical model and detailed procedures are used to develop the application software programs which will be provided to Government and contractor personnel to assist in the performance of the LSA Task.

Included in this report are the Data Flow Diagrams (DFDs) for LSA Subtask 303.2.6, "Training Trade-Offs", and the corresponding descriptions of the processes, data flows, data stores, and external entities identified on each DFD (Annex B). In addition, the DFDs are further developed into step-by-step procedures (Annex C) that identify how to use the data to carry out the processes which ultimately lead to accomplishing the LSA Subtask.

To assist managers in planning and controlling this task, Venture Evaluation Review Technique (VERT) Batch Input files are provided (Annex D). These VERT tools provide government agencies with complete packages to give contractors that cover both technical and managerial aspects of a task. This approach establishes a standardized form of communication and management between contractors performing the task and government personnel reviewing the task.

To view this work in context, Annex E of this report also presents a brief overview of Structured Analysis and its place in the overall systems development process. The overview and certain portions of the introductory text are repeated verbatim in every report in this series so that each report is free standing.

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LIST OF FIGURES

INTRODUCTION

PURPOSE

The purpose of this report series is to present the results of the APJ Structured Analysis/Design under Contract DAAA21-86-D-0025 for coordination with the AMCCOM Program Manager prior to in-depth programming of ILS and LSA functions and processes. LSA Task 303, "Evaluation of Alternatives & Trade-Off Analysis", (LSA Subtask 303.2.6, "Design, Operations and Training Trade-Offs") is addressed in this report.

BACKGROUND

The Department of the Army has a requirement for management control over contractor and Government agency response to the requirements of AR 700-127, "Integrated Logistic Support", and MIL-STD-1388-1, "Logistic Support Analysis". HQs AMCCOM has initiated action to structure each of the LSA tasks, the assessment of each ILS element, the form of the results, and the detailed processes to insure consistency with current Army policies, procedures, and techniques.

This approach (undertaken by AMCCOM and APJ) will insure uniformity in efforts and products, reproducibility of analyses, and a well-defined structure which can be coordinated among all participants in the logistic process to arrive at common understanding and procedures.

SCOPE

This report summarizes the results of the Structured Analysis for the identification of LSA Task 303, "Evaluation of Alternatives & Trade-Off Analysis", LSA Subtask 303.2.6, "Design, Operations and Trade-Offs", and presents the associated Data Flow Diagrams (DFDs) developed from the Structured Analysis and the corresponding procedures developed in the Structured Design. The portions of the Data Dictionary relating to the DFDs for this LSA Subtask includes the labels, names, descriptions, processes, data flows, data stores, and external entities. (The Data Dictionary is a "living document" that evolves through the analysis and design process).

The Data Dictionaries developed for each of the individual LSA Subtasks are integrated together into a Master Data Dictionary. Integration of the individual Data Dictionary involves the combination of similar Data Flows, Data Stores, and External Entities. The resulting Master Data Dictionary may well contain some minor differences from the definitions that

appear in this report. All processes, and of course, the content of the structured design will remain identical.

The Structured Design portion of this report develops the processes and data flows developed in the DFDs into procedures which are used to accomplish the LSA Tasks. The DFDs provide the method and the Design implements it, by formulating a guide for programmers to write software applications.

This report presents a brief overview of Structured Analysis and its place in the overall systems design process to assist the reader who may not be fully briefed on the symbols and conventions used. It is supported by Annex E, which defines each element in Structured Analysis, and by a separate Glossary.

LSA SUBTASK 303.2.6 DESCRIPTION

The "Design, Operations, and Training Trade-Offs" examines design, operations, training and job design to determine the optimum solution for attaining and maintaining the required proficiency of operating and support personnel. The analysis begins by determining the trade-off requirements, evaluation criteria, design constraints and support requirements. The constraints and requirements are analyzed to determine the training impacts in relation to operation and maintenance tasks. Alternative methods to meet or eliminate the training requirement are developed. These alternatives, along with the evaluation criteria and system/operational constraints are input into the trade-off analysis. The concept that maximizes the results of training (i.e., readiness) and minimizes training resources expended should be selected as the optimum training concept.

Results of the training trade-offs are used as inputs to LSA Task 205, "Supportability and Supportability-Related Design Factors", and to LSA Task 401, Task Analysis". Task 401 requires input information on existing personnel, skills, capabilities, and programs of instruction, as well as available training devices.

The LSA Task Description with associated inputs and outputs is extracted from MIL-STD-1388-1A and is included as Annex A.

APPROACH

The APJ approach to Structured Analysis and Structured Design of an LSA Subtask is:

1. Scope the Subtask defined in MIL-STD-1388-1A with the overall task and determine relationship with other LSA Tasks.

2. Review all pertinent documentation (e.g., ARs, MIL-STDs, etc.) applicable to the specific topic.

3. Prepare the Top Level DFDs in context of the Subtask, and develop lower level DFDs to further quantify any complex process identified in the Top Level DFD.

4. Complete the Data Dictionary portion of the Analysis by describing all processes, data flows, data stores and external entities.

5. Apply staff experience in logistic support analysis to assure that the topic has been exhaustively addressed.

6. From the completed DFDs, prepare the step-by-step procedures that form the structured design.

7. Review Data Item Description and other applicable material to develop output reports.

8. If required, revise DFDs and Data Dictionary based on preparation of detailed procedures.

9. Validate results in discussions with Army activities and personnel directly involved in the applicable or related LSA tasks.

NOTE: Structured Analysis and preparation of Data Flow Diagrams (DFDs) was further assisted by the application of the application of Structured Analysis software. Licenced by Index Technology Corporation, Excelerator provides for automated tracking of names, labels, descriptions, multiple levels of detail in the DFDs, and industry standards in symbols and diagramming practices.

LSA SUBTASK 303.2.6 - DESIGN, OPERATIONS, AND TRAINING

The DFD is a tool that shows the flow of data (i.e., data flows from sources) and is processed by activities to produce intermediate or final products.

The DFD provides a useful and meaningful partitioning of a system from the viewpoint of identification and separation of all functions, actions, or processes so that each can be introduced, changed, added, or deleted with minimal disruption of the overall program, i.e., it emphasizes the underlying concept of modularity and identifiable transformations of data into actionable products.

A series of five (5) DFDs have been developed to structure the LSA subtask relative to operations and other support functions:

1. 303.2.6 Training Trade-Off Review

2. 303.2.6.2A Evaluation Criteria

3. 303.2.6.3A Trade-Off Areas

4. 303.2.6.4A Analytical Techniques

5. 303.2.6.5A Conduct Trade-Off Analysis

Each DFD is keyed to the specific task through the identification number assigned in the lower right hand box. The Alpha codes indicate the level of indenture or explosion below the top level, i.e.,:

Top Level.....LSA DFD 303.2.6
First Indenture.....LSA DFD 303.2.6.2A

Each DFD makes reference to the basic LSA task it addresses, as well as the level of indenture (explosion) of the DFD. For example, the first or top level dFD, "303.2.6", refers to the section in MIL-STD-1388-1A which describes the review items. One of the processes (bubbles) on the top level diagram (303.2.6.4) is expanded and identified as "303.2.6.4A". (Alpha A indicates the second level).

Four standard symbols are used in the drawing of a DFD (see Annex E, Figure 1).

A copy of each DFD is presented in Annex B, accompanied by the Data Dictionary process elements. Each entry made in the DFDs has a corresponding entry in the Data Dictionary.

This report presents those Data Dictionary entries necessary to understand the overall concept and provides details of the processes depicted in the DFDs. To facilitate review of the diagrams, data flow, processes, and data store descriptions are provided. As noted above, they will continue to evolve and be expanded in the System Design phase.

VERT DIAGRAMS

The Venture Evaluation Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows systematic planning and control of programs and enables managers to find solutions to real live managerial problems. The VERT Diagrams and Batch Input Files for this task can be found in Annex D. In order to understand how these Input Files were developed, a brief discussion of the methodology used is provided. The same explanation is repeated verbatim in every report.

ANNEX A

—

LSA TASK 303
EVALUATION OF ALTERNATIVES
AND
TRADE-OFF ANALYSIS

ANNEX A
LSA TASK 303
EVALUATION OF ALTERNATIVES AND TRADE-OFF ANALYSIS*

303.1 PURPOSE: To determine the preferred support system alternative(s) for each system/equipment alternative and to participate in alternative system trade-offs to determine the best approach (support, design, and operation) which satisfies the need with the best balance between cost, schedule, performance, readiness, and supportability.

303.2.6 TASK DESCRIPTION:

Conduct evaluations and trade-offs between design, operations, training, and personnel job design to determine the optimum solution for attaining and maintaining the required proficiency of operating and support personnel. Training evaluations and trades shall be conducted and shall consider shifting of job duties between job classifications, alternative technical publications concepts, and alternative mixes of formal training, on-the-job training, unit training, and use of training simulators.

*/ Abstracted verbatim from MIL-STD-1388-1A, April 11, 1983, Pages 36-37.

ANNEX B

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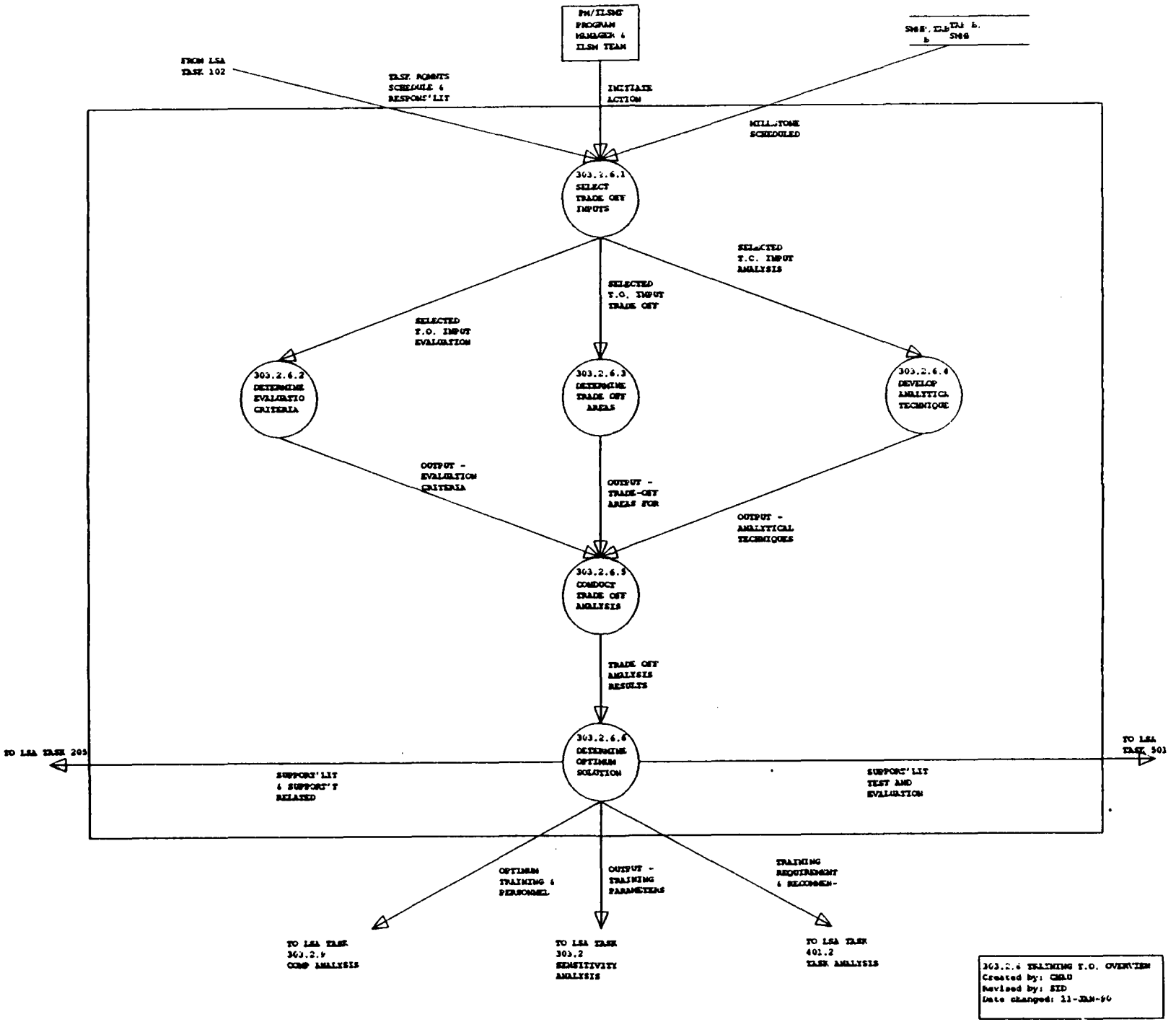
SUBTASK 303.2.6
DATA FLOW DIAGRAMS
AND
PROCESS DATA DICTIONARY


PM/ILSMT
PROGRAM
MANAGER &
ILSM TEAM
SMR', ILS
&
SMR
FROM LSA
TASK 102
TASK REQMTS
SCHEDULE &
RESPONS'LIT
INITIATE
ACTION
MILESTONE
SCHEDULED
303.2.6.1
SELECT
TRADE OFF
INPUTS
SELECTED
T.O. INPUT
ANALYSIS
SELECTED
T.O. INPUT
TRADE OFF
SELECTED
T.O. INPUT
EVALUATION
303.2.6.2
DETERMINE
EVALUATIO
CRITERIA
303.2.6.3
DETERMINE
TRADE OFF
AREAS
303.2.6.4
DEVELOP
ANALYTICA
TECHNIQUE
OUTPUT -
EVALUATION
CRITERIA
OUTPUT -
TRADE-OFF
AREAS FOR
OUTPUT -
ANALYTICAL
TECHNIQUES
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TRADE OFF
ANALYSIS
TRADE OFF
ANALYSIS
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DETERMINE
OPTIMUM
SOLUTION
TO LSA TASK 205
TO LSA
TASK 501
SUPPORT'LIT
& SUPPORT'T
RELATED
SUPPORT'LIT
TEST AND
EVALUATION
OPTIMUM
TRAINING &
PERSONNEL
OUTPUT -
TRAINING
PARAMETERS
TRAINING
REQUIREMENT
& RECOMMEN-
TO LSA TASK
303.2.9
COMP ANALYSIS
TO LSA TASK
303.2
SENSITIVITY
ANALYSIS
TO LSA TASK
401.2
TASK ANALYSIS
303.2.6 TRAINING T.O. OVERVIEW
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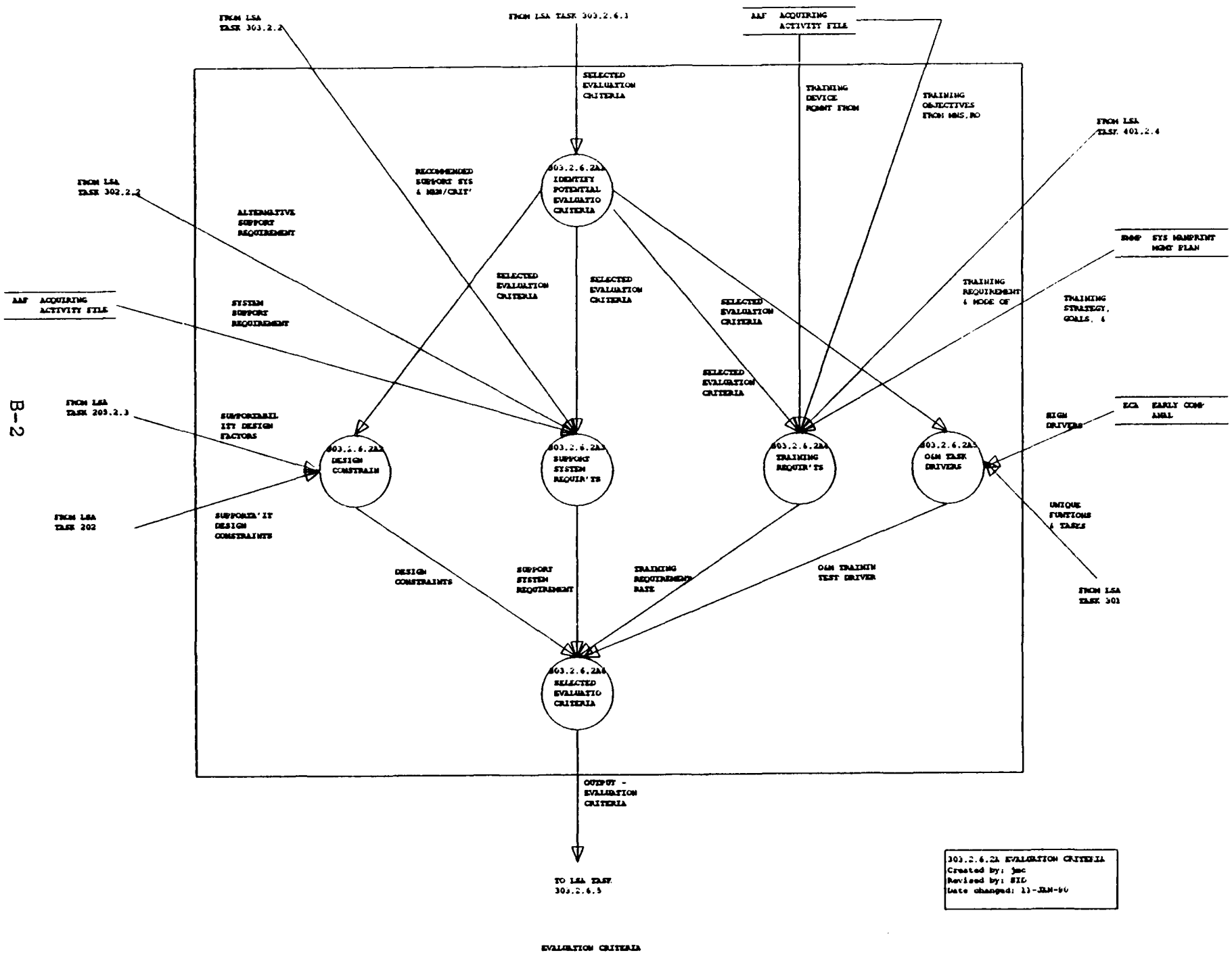
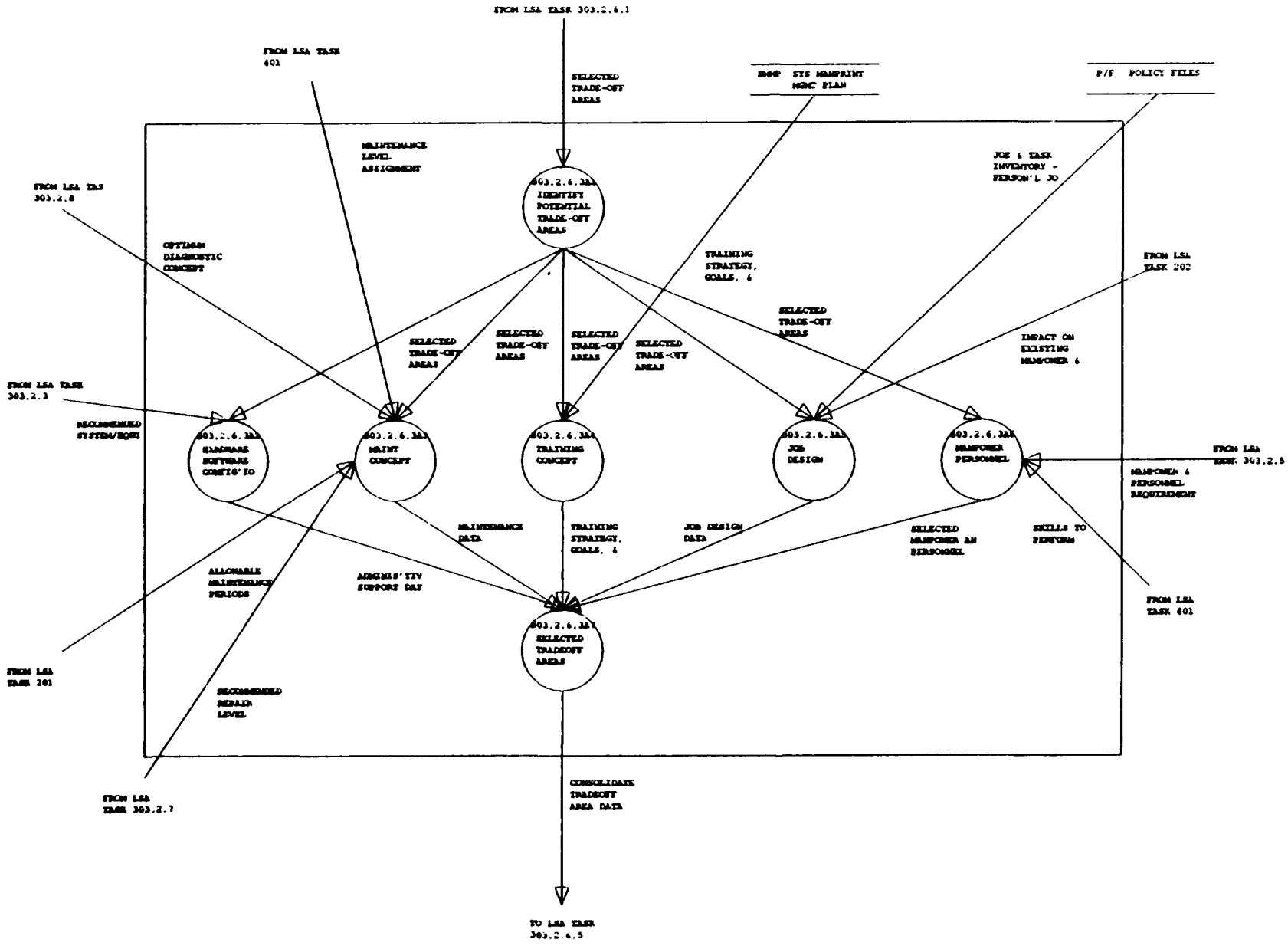
Revised by: SID
Date changed: 11-JAN-90


FROM LSA TASK 303.2.2
FROM LSA TASK 303.2.6.1
AAF ACQUIRING ACTIVITY FILE
SELECTED EVALUATION CRITERIA
TRAINING DEVICE REQMT FROM
TRAINING OBJECTIVES FROM MNS,RO
FROM LSA TASK 401.2.4
RECOMMENDED SUPPORT SYS & MOB/CRIT'
303.2.6.2A1 IDENTIFY POTENTIAL EVALUATIO CRITERIA
FROM LSA TASK 302.2.2
ALTERNATIVE SUPPORT REQUIREMENT
HSI SYS MANPRINT MGMT PLAN
SELECTED EVALUATION CRITERIA
SELECTED EVALUATION CRITERIA
SELECTED EVALUATION CRITERIA
TRAINING REQUIREMENT & MODE OF
TRAINING STRATEGY, GOALS, &
AAF ACQUIRING ACTIVITY FILE
SYSTEM SUPPORT REQUIREMENT
SELECTED EVALUATION CRITERIA
FROM LSA TASK 203.2.3
SUPPORTABIL ITY DESIGN FACTORS
ECA EARLY COMP ANAL
SIGN DRIVERS
303.2.6.2A2 DESIGN CONSTRAIN
303.2.6.2A3 SUPPORT SYSTEM REQUIR'TS
303.2.6.2A4 TRAINING REQUIR'TS
303.2.6.2A5 O&M TASK DRIVERS
FROM LSA TASK 202
SUPPORTA'IT DESIGN CONSTRAINTS
UNIQUE FUNTIONS & TASKS
DESIGN CONSTRAINTS
SUPPORT SYSTEM REQUIREMENT
TRAINING REQUIREMENT RATE
O&M TRAININ TEST DRIVER
FROM LSA TASK 301
303.2.6.2A6 SELECTED EVALUATIO CRITERIA
OUTPUT - EVALUATION CRITERIA
TO LSA TASK 303.2.6.5
303.2.6.2A EVALUATION CRITERIA
Created by: jmc
Revised by: SIG
Date changed: 13-JAN-90
EVALUATION CRITERIA


FROM LSA TASK 303.2.6.1
FROM LSA TASK 401
SELECTED TRADE-OFF AREAS
MAINTENANCE LEVEL ASSIGNMENT
303.2.6.3A IDENTIFY POTENTIAL TRADE-OFF AREAS
OPTIMUM DIAGNOSTIC CONCEPT
TRAINING STRATEGY, GOALS, &
JOB & TASK INVENTORY - PERSON'L JO
FROM LSA TASK 202
SELECTED TRADE-OFF AREAS
IMPACT ON EXISTING MANPOWER &
FROM LSA TASK 303.2.3
RECOMMENDED SYSTEM/EQUI
303.2.6.3B HARDWARE SOFTWARE CONFIG'IO
303.2.6.3C MAINT CONCEPT
303.2.6.3D TRAINING CONCEPT
303.2.6.3E JOB DESIGN
303.2.6.3F MANPOWER PERSONNEL
FROM LSA TASK 303.2.5
MANPOWER & PERSONNEL REQUIREMENT
MAINTENANCE DATA
TRAINING STRATEGY, GOALS, &
JOB DESIGN DATA
SELECTED MANPOWER AN PERSONNEL
SKILLS TO PERFORM
ALLOWABLE MAINTENANCE PERIODS
ADMINIS'TIV SUPPORT DAT
FROM LSA TASK 401
303.2.6.3A SELECTED TRADEOFF AREAS
FROM LSA TASK 201
RECOMMENDED REPAIR LEVEL
FROM LSA TASK 303.2.7
CONSOLIDATE TRADEOFF AREA DATA
TO LSA TASK 303.2.6.5
303.2.6.3A TRADEOFF AREAS
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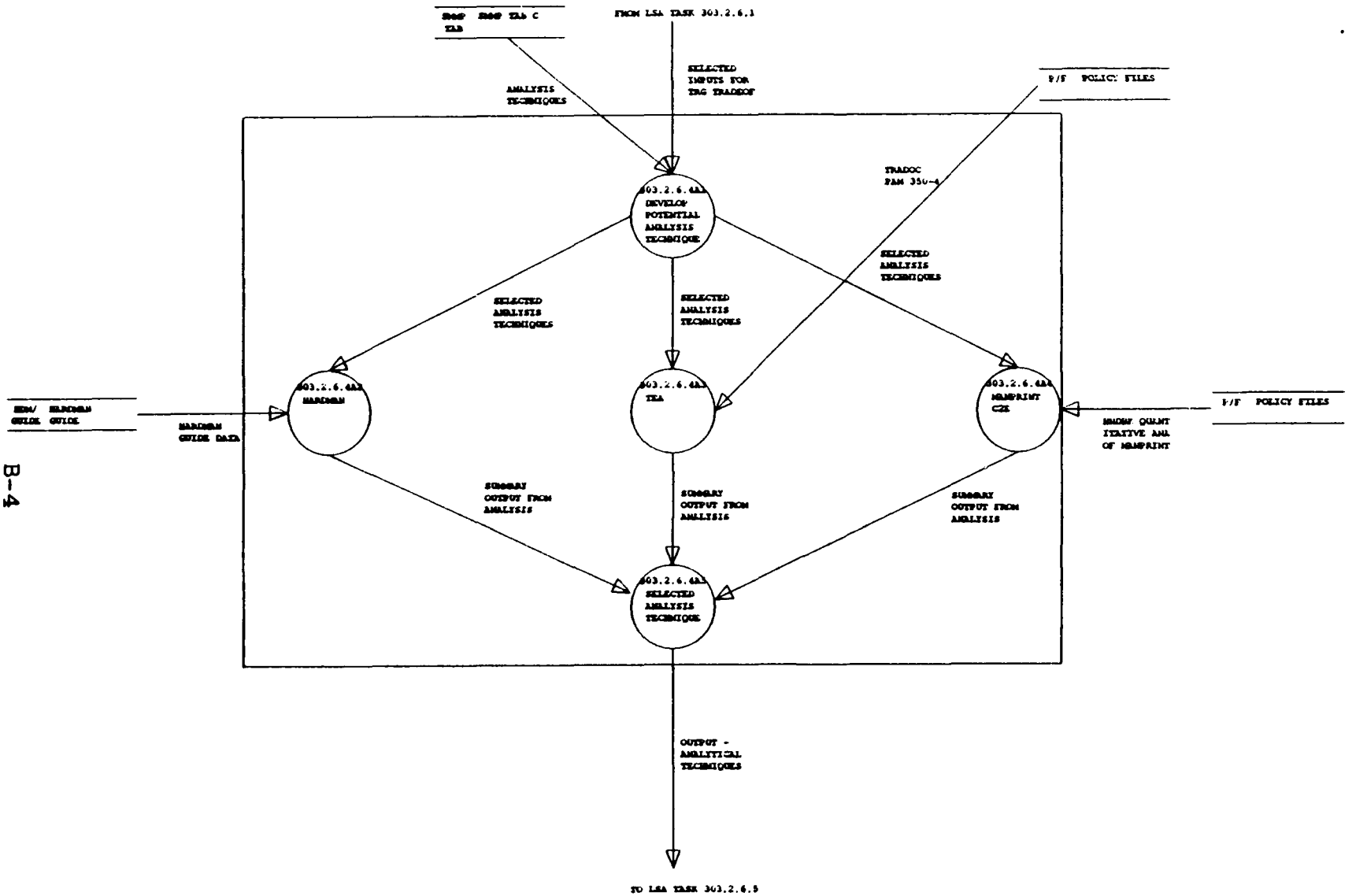
Revised by: SID
Date changed: 11-JAN-96



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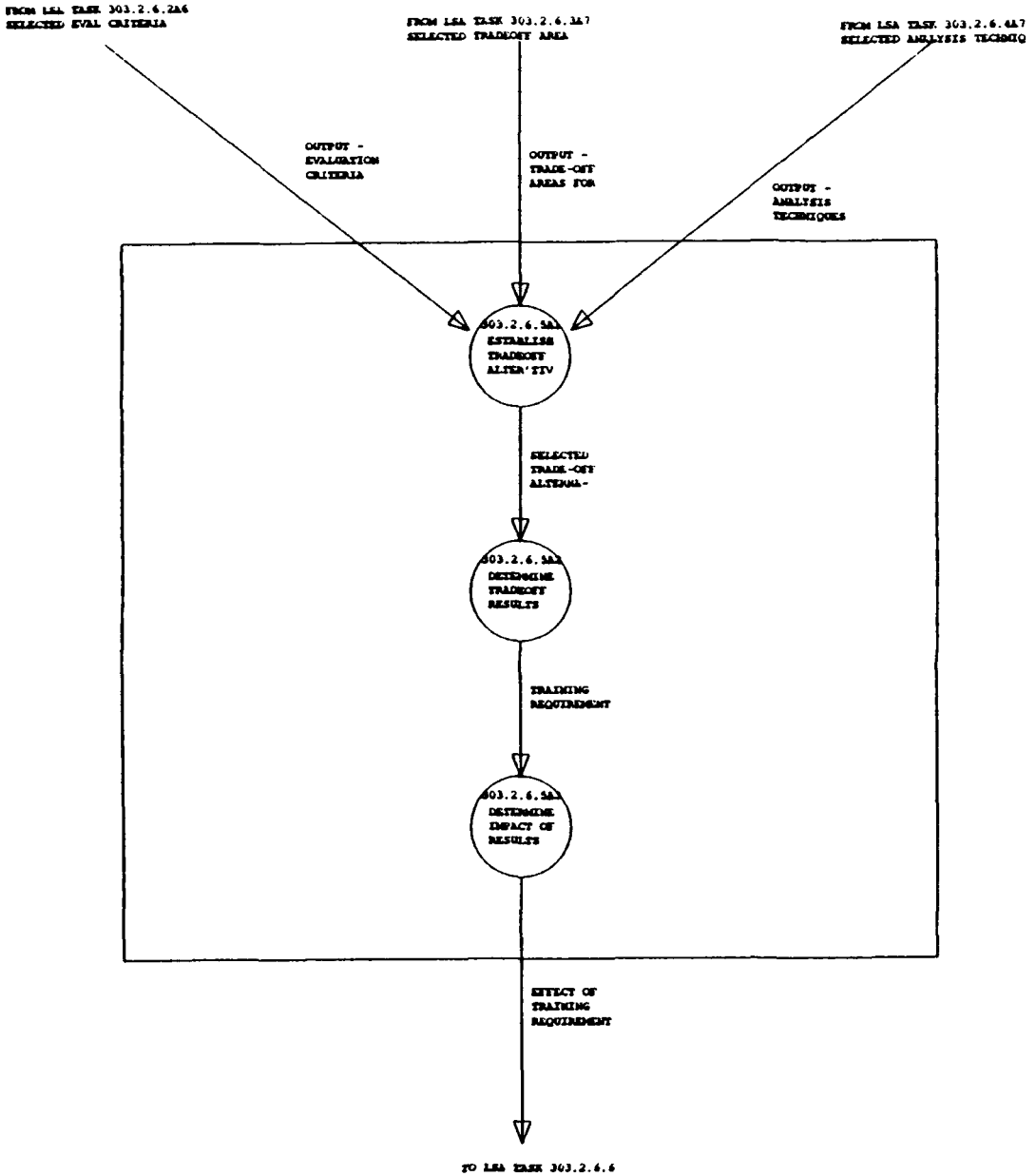
Revised by: SID
Date changed: 11-OCT-86



CONDUCT TRADEOFF ANALYSIS

303.2.6.5A CONDUCT T.O. ANALYSIS
Created by: jmc
Revised by: SID
Date changed: 11-OCT-89

Name	Label	Description
303.2.6.1	SELECT TRADE OFF INPUTS	ACRONYMS: TRADOC - US ARMY TRAINING AND DOCTRINE COMMAND ILS - INTEGRATED LOGISTIC SUPPORT THE SELECTION OF INPUTS FOR TRAINING TRADE OFF ANALYSIS MUST INCLUDE A DETERMINATION OF EVALUATION CRITERIA AND THE POTENTIAL TRADE OFF AREAS TO BE CONSIDERED AS WELL AS THE ANALYTICAL TECHNIQUE/S THAT WILL BE UTILIZED. WHILE THE TRAINING DEVELOPER WITHIN TRADOC WILL PROVIDE THE LEAD, INPUT AND INTERFACING MUST INCLUDE ORGAINZATIONS INVOLVED WITH DESIGN, RELIABILITY, MAINTAINABILITY, SAFETY, HUMAN ENGINEERING, COST ESTIMATING, AND FUNCTIONAL MANAGERS FOR THE ILS ELEMENTS.
303.2.6.2	DETERMINE EVALUATION CRITERIA	THE DETERMINATION OF THE EVALUATION CRITERIA FOR TRAINING TRADE OFF ANALYSES REQUIRES CONSIDERATION OF THE SYSTEM/EQUIPMENT DESIGN CONSTRAINTS, THE SUPPORT SYSTEM REQUIREMENTS, IDENTIFIED TRAINING REQUIREMENTS, AND OPERATION AND MAINTENANCE FUNCTIONS AND TASKS IDENTIFIED AS COSTLY IN TRAINING RESOURCES (HIGH DRIVERS).
303.2.6.2A1	IDENTIFY POTENTIAL EVALUATION CRITERIA	THE IDENTIFICATION OF POTENTIAL EVALUATION CRITERIA FOR A TRAINING TRADE-OFF ANALYSIS SHOULD INCLUDE QUALITATIVE AND QUANTITATIVE DESIGN CONSTRAINTS, THE SYSTEM'S SUPPORT REQUIREMENTS, ALL ESTABLISHED TRAINING REQUIREMENTS, AS WELL AS ANY IDENTIFIED OPERATION AND/OR MAINTENANCE TASKS WHICH ARE SUPPORTABILITY, COST AND/OR READINESS DRIVERS.
303.2.6.2A2	DESIGN CONSTRAINT	ACRONYMS: LSA - LOGISTIC SUPPORT ANALYSIS ESTABLISHED AND UPDATED SUPPORTABILITY AND SUPPORTABILITY-RELATED DESIGN CONSTRAINTS CAN BE OBTAINED FROM LSA TASK 205.2.3, SPECIFICATION REQUIREMENTS, CONDUCTED BY THE MATERIEL PROPONENT AND INCLUDED IN REQUIREMENT DOCUMENTS AND SPECIFICATIONS, AS WELL AS DOCUMENTED QUANTITATIVELY AND QUALITATIVELY IN THE LSAR DATA RECORD A. iN ADDITION, RESULTS FROM LSA TASK 202, MISSION HARDWARE, SOFTWARE AND SUPPORT SYSTEM STANDARDIZATION DEFINE SUPPORTABILITY DESIGN CONSTRAINTS FOR A NEW SYSTEM BASED ON USING EXISTING LOGISTIC SUPPORT RESOURCES, INCLUDING TRAINING MATERIELS/EQUIPMENT.
303.2.6.2A3	SUPPORT SYSTEM REQUIR'TS	ACRONYMS: ROC - REQUIRED OPERATIONAL CAPABILITIES SUPPORT SYSTEM REQUIREMENTS FOR INPUT TO A TRAINING TRADE-OFF ANALYSIS ARE AVAILABLE FROM RESULTS OF LSA TASK 302, SUPPORT SYSTEM ALTERNATIVES, WHICH IDENTIFIES SYSTEM LEVEL SUPPORT CONCEPTS AND SUPPORT SYSTEM ALTERNATIVES. LSA TASK 302.2.2 ESTABLISHES UPDATED ALTERNATIVE SUPPORT CONCEPTS FROM SYSTEM TRADE-OFFS AND ADDRESSES DRIVERS AND UNIQUE FUNCTIONAL REQUIREMENTS. RESULTS FROM LSA TASK 303.2.2, SUPPORT SYSTEM TRADE-OFF ANALYSIS, PROVIDE A RECOMMENDED SUPPORT SYSTEM FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE WITH IDENTIFICATION OF NEW OR CRITICAL SUPPORT RESOURCE REQUIREMENTS. IN ADDITION TO THE ABOVE, PARA 7 OF THE REQUIRED OPERATIONAL CAPABILITY (ROC) ADDRESSES SUPPORT SYSTEM REQUIREMENTS.

Name	Label	Description
303.2.6.2A4	TRAINING REQUIR'TS	TRAINING REQUIREMENTS INPUT TO THE TRAINING TRADE-OFF ANALYSIS SHOULD BE BASED ON TRAINING OBJECTIVES IF CONTAINED IN REQUIREMENTS DOCUMENTS, SUCH AS THE MAJOR NEW START (MNS), THE O&O PLAN, AND ROC. PARA 7 OF THE O&O PLAN ADDRESSES TRAINING CONSTRAINTS APPLICABLE TO SYSTEM DEVELOPMENT, INCLUDING TIME-TO-TRAIN LIMITS AND REQUIREMENTS FOR TRAINING SIMULATORS. PARA 8 OF THE ROC INCLUDES A TRAINING ASSESSMENT WITH NEED FOR TRAINING DEVICES AND EMBEDDED TRAINING. APPENDIX 4 OF THE ROC DOCUMENTS THE TRAINING DEVICE REQUIREMENTS. IN ADDITION, THE SMMP INCLUDES TRAINING STRATEGY, GOALS AND CONSTRAINTS WITH SPECIFIC TRAINING OBJECTIVES CONTAINED IN PARA 3A. LSA TASK 401, TASK ANALYSIS, INCLUDES TRAINING ANALYSIS WITH RESULTS DOCUMENTED ON DATA RECORD CARD D06, BLOCK 7, PERSONNEL SUMMARY AND DATA RECORD E, WHICH IDENTIFIES AND JUSTIFIES EACH NEW TRAINING ITEM. IN ADDITION, DATA RECORD G DOCUMENTS ANY MODIFIED/NEW SKILLS TO IDENTIFY REQUIREMENTS FOR MODIFICATION OR ESTABLISHMENT OF TRAINING PROGRAMS TO PROVIDE THE SKILLS.
303.2.6.2A5	O&M TASK DRIVERS	THE IDENTIFICATION OF OPERATION AND MAINTENANCE TASKS FOR THE NEW SYSTEM WHICH MAY BE OR ARE COSTLY IN TRAINING RESOURCES IS NECESSARY INPUT FOR A TRAINING TRADE-OFF ANALYSIS. INPUT FOR IDENTIFYING THESE HIGH DRIVERS BY COMPONENT FOR EACH MOS IS THE EARLY COMPARABILITY ANALYSIS (ECA) PROCESS REPORT, IF CONDUCTED. IN ADDITION, LSA TASK 301, FUNCTIONAL REQUIREMENTS IDENTIFICATION, IDENTIFIES UNIQUE FUNCTIONAL REQUIREMENTS WHICH ARE SUPPORTABILITY, COST AND READINESS DRIVERS, AS WELL AS SPECIFIC OPERATING AND MAINTENANCE TASKS FOR THE FUNCTIONS REQUIRING SUPPORT RESOURCES, INCLUDING TRAINING AND TRAINING EQUIPMENT.
303.2.6.2A6	SELECTED EVALUATION CRITERIA	EVALUATION CRITERIA TO BE USED IN THE TRAINING TRADEOFF ANALYSIS ARE SELECTED FROM THOSE PRESENTED IN PROCESS 303.2.6.2A2 THROUGH 303.2.6.2A5.
303.2.6.3	DETERMINE TRADE OFF AREAS	THE DETERMINATION OF POSSIBLE TRAINING TRADE-OFF AREAS MUST INCLUDE CONSIDERATION OF THE SYSTEM EQUIPMENT HARDWARE AND SOFTWARE CONFIGURATION, THE MAINTENANCE CONCEPT, TRAINING CONCEPT, ESTABLISHED JOB DESIGNS, AND MANPOWER AND PERSONNEL REQUIREMENTS.
303.2.6.3A1	IDENTIFY POTENTIAL TRADE-OFF AREAS	THE IDENTIFICATION OF POTENTIAL INPUT AREAS AS SOURCE DATA FOR CONDUCTING A TRAINING TRADE-OFF ANALYSIS SHOULD INCLUDE IDENTIFIED HARDWARE AND SOFTWARE CONFIGURATIONS, PLANNED OR ESTALISHED MAINTENANCE AND TRAINING CONCEPTS, CURRENT JOB DESIGN FOR OPERATOR AND MAINTAINERS, AND THE MANPOWER AND PERSONNEL SELECTED FOR THE NEW SYSTEM/EQUIPMENT.

	Name	Label	Description
	303.2.6.3A2	HARDWARE SOFTWARE CONFIG'ION	ACRONYM: LSA - LOGISTIC SUPPORT ANALYSIS THE CONFIGURATION OF THE SYSTEM/EQUIPMENT HARDWARE AND SOFTWARE IS VITAL INPUT TO A TRAINING TRADE-OFF ANALYSIS SINCE IT IS WHAT THE OPERATOR AND SUPPORT PERSONNEL MUST BE TRAINED TO OPERATE AND MAINTAIN EFFECTIVELY. INPUT IS AVAILABLE FROM RESULTS OF LSA TASK 303.2.3, SYSTEM TRADE-OFF ANALYSIS, WHICH PROVIDES RECOMMENDED SYSTEM/EQUIPMENT ALTERNATIVES BASED ON COST, SCHEDULE, PERFORMANCE, READINESS, AND SUPORTABILITY FACTORS.
	303.2.6.3A3	MAINT CONCEPT	ACRONYMS: LSA - LOGISTICS SUPPORT ANALYSIS MTTR - MEAN-TIME-TO-REPAIR THE MAINTENANCE CONCEPT AND RESULTANT MAINTENANCE PLAN DETERMINE REQUIREMENTS AND CONDITIONS UNDER WHICH SUPPORT PERSONNEL MUST PERFORM ASSIGNED RESPONSIBILITIES WITH NECESSARY SKILLS PROVIDED BY TRAINING PROGRAMS. INPUT SHOULD BE OBTAINED FROM RESULTS OF THE FOLLOWING LSA TASKS WHICH PROVIDE DOCUMENTED DATA AS NOTED. A. LSA TASK 201, USE STUDY - TO PROVIDE QUANTITATIVE ALLOWABLE MAINTENANCE PERIODS (MEAN-TIME-TO-REPAIR (MTTR), REPAIR TURNAROUND TIME). B. LSA TASK 303.2.7, LEVEL OF REPAIR ANALYSIS, PROVIDES AN ECONOMICAL AND EFFECTIVE DECISION ON ASSIGNMENT OF MAINTENANCE LEVELS WHERE FAILED ITEMS OF HARDWARE WILL BE REPAIRED OR REPLACED. C. LSA TASK 303.2.8, DIAGNOSTIC TRADE-OFF ANALYSIS WHICH IDENTIFIES THE OPTIMUM DIAGNOSTIC CONCEPT FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE. D. LSA TASK 401, TASK ANALYSIS, WHICH PROVIDES MAINTENANCE FUNCTIONS/TASKS TO BE PERFORMED AND THE LEVEL OF MAINTNANCE AT WHICH IT IS PERFORMED.
	303.2.6.3A4	TRAINING CONCEPT	ACRONYM: TRADOC - US ARMY TRAINING AND DOCTRINE COMMAND SMMP - SYSTEM MANPRINT MANAGEMENT PLAN THE TRAINING CONCEPT IS NORMALLY DEVELOPED AND DOCUMENTED BY THE TRAINING DEVELOPER WITHIN TRADOC AND CONSISTS OF TRAINING STRATEGIES, GOALS, AND CONSTRAINTS CONTAINED IN PARAGRAPH 3A OF THE SYSTEM MANPRINT MANAGEMENT PLAN (SMMP). REQUIREMENT MAY INCLUDE LOCATION OF CRITICAL TASK TRAINING, INSTITUTIONAL TRAINING COURSE LENGTH/DURATION AND UNIT TRAINING TIME. ADDITIONAL MANPRINT GOALS CONCERNING MANPOWER, PERSONNEL, AND HUMAN FACTORS ENGINEERING FROM PARAGRAPH 3A OF THE SMMP MAY ALSO IMPACT THE TRAINING CONCEPT.

Name	Label	Description
303.2.6.3A5	JOB DESIGN	ACRONYM: MOS - MILITARY OCCUPATIONAL SPECIALITY NCO - NON COMMISSIONED OFFICER LSA - LOGISTIC SUPPORT ANALYSIS A DESCRIPTION AND DETERMINATION OF THE JOB DESIGN FOR INTENDED OPERATOR AND SUPPORT PERSONNEL DESIGNATED FOR THE NEW SYSTEM/EQUIPMENT SHOULD BE OBTAINED FOR INPUT TO A TRAINING TRADE-OFF ANALYSIS. THESE CAN BE OBTAINED FROM POLICY FILES CONTAINING THE JOB AND TASK INVENTORY FOR PERSONNEL JOB CLASSIFICATIONS. MOS DESIGNATION AND DESCRIPTIONS WILL PROVIDE INFORMATION ABOUT JOBS PERFORMED IN THE SPECIALTY, ENTRY LEVEL CHARACTERISTICS, AND SPECIAL INFORMATION SUCH AS SECURITY CLEARANCE REQUIREMENTS. IT ALSO INCLUDES A JOB DESCRIPTION OF MAJOR DUTIES AT DIFFERENT SKILL LEVELS AND DESCRIBES THE TASKS TRAINED DURING ADVANCED INDIVIDUAL TRAINING, ADVANCED NCO EDUCATION, AND UNIT TRAINING. IN ADDITION, INFORMATION ON EXISTING/PLANNING PERSONNEL SKILL LEVELS AND QUANTITIES ARE UTILIZED IN LSA TASK 202, MISSION HARDWARE, SOFTWARE AND SUPPORT SYSTEM STANDARDIZATION TO IDENTIFY RISK ASSOCIATED WITH USING EXISTING PERSONNEL AND MANPOWER.
303.2.6.3A6	MANPOWER & PERSONNEL	ACRONYMS: LSA - LOGISTICS SUPPORT ANALYSIS LSAR - LOGISTICS SUPPORT ANALYSIS RECORD INFORMATION ON THE MANPOWER (NUMBERS OF PEOPLE) AND PERSONNEL (TYPES OF SKILLS) AREA FOR INPUT TO THE TRAINING TRADE-OFF ANALYSIS CAN BE OBTAINED FROM RESULTS OF LSA TASK 303.2.5, MANPOWER AND PERSONNEL TRADE-OFF ANALYSIS, WHERE PERSONNEL REQUIREMENTS, JOB CLASSIFICATIONS, SKILL LEVELS AND EXPERIENCE ARE EVALUATED FOR ALTERNATE SYSTEM CONCEPTS. IN ADDITION, IDENTIFIED SKILLS ARE DOCUMENTED ON LSAR DATA RECORD D FOR EACH STEP IN THE SEQUENTIAL TASK DESCRIPTION PREPARED FROM LSA TASK 401, TASK ANALYSIS. IF THE IDENTIFIED SKILLS ARE NOT CAPABLE OF PERFORMING THE TASKS BASED ON THEIR CURRENT TRAINING PROGRAM, A NEW OR MODIFIED SKILL IS INDICATED WITH THE MODIFIED NEW SKILL REQUIREMENT DETAILED ON DATA RECORD G.
303.2.6.3A7	SELECTED TRADEOFF AREAS	SELECTED TRADE-OFF AREAS CONSIST OF QUANTITATIVE AND QUALITATIVE DATA FROM THE PRECEDING FIVE PROCESSES WHICH IMPACT ON TRAINING REQUIREMENTS AND WHICH THEREFORE MUST BE UTILIZED IN THE TRAINING TRADE-OFF ANALYSIS.
303.2.6.4	DEVELOP ANALYTICAL TECHNIQUES	DEVELOPMENT OF USABLE ANALYSIS TECHNIQUES FOR THE TRAINING TRADE-OFF ANALYSIS WILL BE DEPENDENT UPON THE PHASE OF THE MATERIEL ACQUISITION AND UPON THE NATURE AND THRUST OF EXPECTED RESULTS FROM THAT ANALYSIS. TECHNIQUES AVAILABLE FOR CONSIDERATION INCLUDE THOSE USED IN ARMY HARDWARE VERSUS MANPOWER COMPARABILITY ANALYSIS (HARDMAN), TRAINING EFFECTIVENESS ANALYSIS (TEA), AND MANPOWER AND PERSONNEL INTEGRATION CONTINUOUS AND COMPREHENSIVE EVALUATION (MANPRINT C2E).

Name	Label	Description
303.2.6.4A1	DEVELOP POTENTIAL ANALYSIS TECHNIQUES	THE DEVELOPMENT OF POTENTIAL ANALYSIS TECHNIQUES FOR CONDUCTING A TRAINING TRADE-OFF ANALYSIS SHOULD INCLUDE CONSIDERATION OF AND SELECTION FROM AVAILABLE AND APPROVED TECHNIQUES NOTED IN PROCESSES 303.2.6.4A2 THROUGH A4. THE TECHNIQUE DEVELOPED WILL BE DETERMINED BY THE RESULTS DESIRED AND THE EXTENT OF INPUT DATA AVAILABLE TO CONDUCT THE ANALYSIS. IN ADDITION, THE PURPOSE OF THE ANALYSIS WILL DEPEND UPON THE ACQUISITION PHASE WHEN CONDUCTED. THE PURPOSE OF CONDUCTING A TRAINING TRADE-OFF ANALYSIS DURING EACH OF THE FOLLOWING OR EQUIVALENT PHASES IS AS NOTED: A. PREPROGRAM - TO DEVELOP TRAINING GOALS AND CONSTRAINTS FOR MISSION AND SUPORT SYSTEM CONCEPTS B. CONCEPT PHASE - TO DEVELOP DESIGNS THAT MEET TRAINING GOALS, CONTRAINTS, AND PERFORMANCE REQUIREMENTS. C. DEMONSTRATION AND VALIDATION PHASE - TO TRADE OFF ALTERNATIVE DESIGN OPTIONS AND OPERATIONAL ALTERNATIVES TO OPTIMIZE TRAINING REQUIREMENTS. D. FULL SCALE DEVELOPMENT PHASE - TO ESTABLISH DESIGN AND SUPPORT SYSTEM DEFINITIONS AND VALIDATE DESIGN COMPLIANCE IN RELATION TO TRAINING. TAB C OF THE SYSTEM MANPRINT MANAGEMENT PLAN (SMMP) WILL PROVIDE INPUT SINCE IT IDENTIFIES TASKS, ANALYSES, TRADE-OFFS, AND DECISIONS THAT MUST BE MADE TO ADDRESS MANPRINT ISSUES.
303.2.6.4A2	HARDMAN	ACRONYMS: MOS - MILITARY OCCUPATIONAL SPECIALITY HCM - HARDMAN COMPARABILITY METHODOLOGY MPT - MANPOWER, PERSONNEL AND TRAINING THE HARDWARE VERSUS MANPOWER COMPARABILITY ANALYSIS (HARDMAN) IS A MODEL TO IDENTIFY CRITICAL MANPOWER, PERSONNEL AND TRAINING (MPT) REQUIREMENTS GENERATED BY AN EMERGING SYSTEM DESIGN. THE MODEL CONSISTS OF SIX INTERRELATED STEPS DESCRIBED IN THE HARDMAN COMPARABILITY METHODOLOGY (HCM) GUIDE FOR ASSESSMENT OF WEAPON RESOURCE REQUIREMENTS AND THEIR IMPACT ON ARMY PERSONNEL AND TRAINING SYSTEMS. THE FINAL STEP SIX IS THE PERFORMANCE OF A TRADE-OFF ANALYSIS TO PROVIDE A COST/BENEFIT ANALYSIS OF SOLUTIONS AND RESULTING MPT REQUIREMENTS WITH AN AUDIT TRAIL OF FINDINGS. THE OUTPUT IS SYSTEM SPECIFIC QUALITATIVE (BY MOS & GRADE) AND QUANTITATIVE MPT REQUIREMENTS INCLUDING TRAINING CURRICULA AND RESOURCES, SUCH AS TRAINING MATERIELS AND TRAINING DEVICES. RESULTS FROM HARDMAN PROVIDE QUANTIFIED MANPOWER REQUIREMENTS BY MOS AND SKILL LEVEL, QUANTIFIED SUSTAINMENT REQUIREMENTS FOR PERSONNEL, PROJECTED TRAINING INCREASES BY MOS, AND PROJECTED ANNUAL TRAINING COSTS.

Name	Label	Description
303.2.6.4A3	TEA	ACRONYMS: TRADOC - US ARMY TRAINING AND DOCTRINE COMMAND TEA - TRAINING EFFECTIVENESS ANALYSIS THE TRAINING EFFECTIVENESS ANALYSIS (TEA) IS CONDUCTED IN TRADOC IN ACCORDANCE WITH TRADOC PAM 350-4. TEA IS A SERIES OF STUDIES OF HARDWARE-ORIENTED TOTAL SYSTEMS DEVELOPED TO ASSESS THE IMPACT OF TRAINING ON TOTAL SYSTEM EFFECTIVENESS AND ALSO TO INSURE DEVELOPMENT AND IMPLEMENTATION OF COST EFFECTIVE TRAINING SUBSYSTEMS. THE GOAL OF THE TEA IS TO FIELD COST EFFECTIVE TRAINING SUBSYSTEMS CONCURRENT WITH NEW HARDWARE. OUTPUTS OBTAINED FROM THE TEA INCLUDE SOLDIER SELECTION CRITERIA, SOLDIER HARDWARE INTERFACING CONSIDERATIONS, AND IDENTIFICATION OF POTENTIAL TRAINING PROBLEMS.
303.2.6.4A4	MANPRINT C2E	THE MANPOWER AND PERSONNEL INTEGRATION CONTINUOUS AND COMPREHENSIVE EVALUATION (MANPRINT C2E) IS CONDUCTED TO DETERMINE THE ADEQUACY WITH WHICH A NEW SYSTEM DESIGN WILL SUPPORT CURRENT ARMY SOLDIERS IN SUCCESSFULLY ACHIEVING ITS ASSIGNED MISSIONS. THE OBJECTIVES ARE ACHIEVED BY QUANTITATIVE SYSTEM ANALYSIS AND MODELING, HUMAN PERFORANCE MEASUREMENT AND EVALUATION, AND BY STATISTICAL TECHNIQUES. THE OBJECTIVE IN TRAINING IS TO DETERMINE THE RELATIONSHIP BETWEEN SOLDIER CHARACTERISTICS AND SOLDIER PERFORMANCE. SOLDIER CHARACTERISTICS INCLUDE TRAINING, APTITUDES AND PHYSICAL ATTRIBUTES. A QUESTION ADDRESSED IN RESPONDING TO THIS OBJECTIVE IS: WHICH SOLDIER CHARACTERISTICS ARE RELATED TO SOLDIER PERFORMANCE OF CRITICAL OPERATIONS AND MAINTENANCE TASKS? THIS INVOLVES IDENTIFICATION OF TRAINING REQUIRED FOR THE CRITICAL OPERATIONS AND MAINTENANCE TASKS. THE HANDBOOK FOR QUANTITATIVE ANALYSIS OF MANPRINT CONSIDERATIONS IN ARMY SYSTEMS, 13 JUNE 1986 CONTAINS DOCUMENTATION ON MANPRINT C2E .
303.2.6.4A5	SELECTED ANALYSIS TECHNIQUE	THE SELECTION OF THE ANALYSIS TECHNIQUE FOR THE TRAINING TRADE-OFF ANALYSIS WILL VARY WITH THE ACQUISITION PHASE WHEN CONDUCTED, THE INPUT DATA AVAILABLE, AND THE RESULTS DESIRED. THE ANALYSIS MAY BE AT THE SYSTEM LEVEL TO IDENTIFY CROSS TRAINING RESOURCE REQUIREMENTS FOR ALTERNATIVE CONCEPTS AND RELATING THE OPERATIONAL AND SUPPORTABILITY CHARACTERISTICS TO THE SYSTEM READINESS OBJECTIVE (SRO). ADDITIONALLY, IT MAY BE AN ANALYSIS FOR SUPPORT SYSTEM OPTIMIZATION WITH DATA USED AS INPUT TO DEVELOPMENT OF SPECIFIC TRAINING REQUIREMENTS AS A DATA PRODUCT.
303.2.6.5	CONDUCT TRADE OFF ANALYSIS	THE PERFORMANCE OF THE TRAINING TRADE OFF ANALYSIS UTILIZES AS INPUTS RESULTS OF THE PRECEEDING THREE PROCESSES FOR SELECTED EVALUATION CRITERIA, TRADE OFF AREAS, AND ANALYTICAL TECHNIQUE SELECTED FOR COST EFFECTIVE RETURN ON INVESTMENT. FROM THESE INPUTS, TRAINING TRADE OFF ALTERNATIVES ARE ESTABLISHED, TRADE OFF RESULTS ARE DETERMINED, AND THE EFFECT OR IMPACT OF IMPLEMENTING THE RESULTS ARE DETERMINED FOR SUBSEQUENT EVALUATION.

Name	Label	Description
303.2.6.5A1	ESTABLISH TRADEOFF ALTERNATIVE	THE PROCESS OF ESTABLISHING TRADEOFF ALTERNATIVES AS A PART OF THE TRAINING TRADEOFF ANALYSIS IS TO IDENTIFY OPTIONS WHICH MAY REDUCE TRAINING REQUIREMENTS FOR THE NEW SYSTEM/EQUIPMENT. INPUTS WHICH SERVE AS SOURCE DATA RESULT FROM THE PRECEDING PROCESSES WHICH PROVIDE SELECTED EVALUATION CRITERIA, TRADEOFF AREAS WHICH HAVE POTENTIAL FOR ACQUIRING FEASIBLE TRAINING IMPROVEMENTS, AND FINALLY, THE ANALYSIS TECHNIQUE WHICH HAS BEEN IDENTIFIED FOR USE AT THE SPECIFIC TIME OR POINT IN THE ACQUISITION PROGRAM. SINCE THE SOLE PURPOSE OF THE TRAINING IS TO PROVIDE SKILLS TO INDIVIDUALS FOR SUCCESSFUL JOB PERFORMANCE TO OPERATE AND SUPPORT A MATERIEL SYSTEM, THE RANGE AND QUANTITY OF ALTERNATIVES SHOULD INCLUDE CONSIDERATION OF THE ENTIRE CROSS SECTION OF MATERIEL ACQUISITION FROM SUPPORTABILITY DESIGN CONSTRAINTS TO THE CURRENT CAPABILITIES AND AVAILABILITY OF EXISTING MANPOWER, PERSONNEL, PROGRAMS OF INSTRUCTION, AND TRAINING DEVICES WHICH WERE PREVIOUSLY DEVELOPED AND ARE CURRENTLY BEING UTILIZED.
303.2.6.5A2	DETERMINE TRADEOFF RESULTS	RESULTS OBTAINED FROM THE TRADEOFF ANALYSIS ARE A SET OF TRAINING VALUES AND REQUIREMENTS WHICH REFLECT THE SELECTED ALTERNATIVES. THE DETERMINATION IS FROM AN EVALUATION OF AND COMPROMISE BETWEEN DESIGN, OPERATIONAL REQUIREMENTS, PERSONNEL FOR DESIGNS, AND NECESSARY TRAINING TO PRODUCE AN OPTIMUM SOLUTION FOR ATTAINING AND MAINTAINING REQUIRED PROFICIENCY OF OPERATING AND SUPPORT PERSONNEL. THE OPTIMUM SOLUTION SHOULD ADDRESS AND REDUCE AREAS OF IDENTIFIED HIGH RESOURCE DRIVERS AND HIGH TRAINING DEMANDS, AND SHOULD BE CONCENTRATED ON AREAS WHICH WOULD PROVIDE THE GREATEST OPPORTUNITY FOR REDUCING TRAINING DEMAND. IN ADDITION, RESULTS MUST BE FEASIBLE AND IMPLEMENTABLE WITHIN THE OVERALL ARMY SYSTEM.
303.2.6.5A3	DETERMINE IMPACT OF RESULTS	THE PROCESS OF DETERMINING THE IMPACT FROM RESULTS OF THE TRAINING TRADEOFF ANALYSIS MUST INCLUDE AN EVALUATION OF ANY NEW OR REVISED TRAINING ALTERNATIVES TO DETERMINE THEIR AFFECT ON ESTABLISHED TRAINING CONCEPTS AND CAPABILITIES, ON ANY MANPOWER AND PERSONNEL COSTS RELATED TO THE IDENTIFIED TRAINING, AND TO COSTS AND SCHEDULES RELATED TO REQUIRED NEW OR REVISED TRAINING MATERIELS, SIMULATORS, OR TRAINING DEVICES. A COMPARISON SHOULD BE MADE TO ALL IDENTIFIED BASE VALUES AND ESTABLISHED REQUIREMENTS OR CONSTRAINTS.
303.2.6.6	DETERMINE OPTIMUM SOLUTION	RESULTS FROM THE TRAINING TRADE OFF ANALYSIS MUST BE EVALUATED TO ARRIVE AT AN OPTIMUM TRAINING SOLUTION FOR ATTAINING AND MAINTAINING THE REQUIRED PROFICIENCY OF APPLICABLE OPERATING AND SUPPORT PERSONNEL. THIS OPTIMUM SOLUTION IS IN TURN USED AS INPUT TO OTHER LSA TASKS TO OPTIMIZE THE COMPLETE SUPPORT SYSTEM AND TO DEVELOP AND ACQUIRE A COMPLETE SYSTEM WHICH ACHIEVES THE BEST BALANCE BETWEEN COST, SCHEDULE, PERFORMANCE, AND SUPPORTABILITY.

Name	Label	Description
ADMIN/SUPP/DATA	ADMINISTRATIVE SUPPORT DATA	THIS DATA FLOW CONTAINS THE DATA IDENTIFYING THE ADMINISTRATIVE INFORMATION (e>g> SYSTEM/EQUIPMENT CONTRACT SCHEDULES) AND SUPPORT RESOURCE REQUIREMENT DATA FOR THE SYSTEM/EQUIPMENT.
ALLOW/MAINT/PERD	ALLOWABLE MAINTENANCE PERIODS	ACRONYMS: LSA - LOGISTIC SUPPORT ANALYSIS MTTR - MEAN-TIME-TO-REPAIR OUTPUT FROM LSA TASK 201, USE STUDY, IN WHICH A PORTION OF IDENTIFIED SUPPORTABILITY FACTORS ARE RELATED TO THE INTENDED USE OF THE NEW SYSTEM/EQUIPMENT. THE ALLOWABLE MAINTENANCE PERIODS ARE EXPRESSED AS MEAN-TIME-TO-REPAIR (MTTR) AND/OR REPAIR TURN AROUND TIME.
ALT/SUP/RQMNTS	ALTERNATIVE SUPPORT REQUIREMENTS	OUTPUT FROM LSA TASK 302.2.2, WHICH UPDATES SUPPORT SYSTEM ALTERNATIVES AS SYSTEM TRADE-OFFS ARE CONDUCTED AND NEW SYSTEM ALTERNATIVES ARE BETTER DEFINED.
ANA/TECHN	ANALYSIS TECHNIQUES	ACRONYM: SMMP - SYSTEM MANPRINT MANAGEMENT PLAN OUTPUT FROM TAB C OF THE SMMP WHICH IDENTIFIES ANALYSIS TECHNIQUES TO BE UTILIZED WITH RATIONALE (WHY NECESSARY?), RESOURCES REQUIRED INCLUDING DATA CONCERNING TRAINING OF OPERATORS AND MAINTAINERS, AND REQUIRED TASK FLOW.
CONS/TO/AREA/DATA	CONSOLIDATED TRADEOFF AREA DATA	ACRONYM: TOA - TRADE OFF ANALYSIS THIS DATA DEVELOPED AND/OR ACCUMULATED IN PROCESSES 303.2.6.3A2 THROUGH 303.2.6.3A6 INCLUDING THE TRAINING IMPLICATION INFORMATION DEVELOPED IN THIS PROCESS ARE CONSOLIDATED AND PREPARED FOR FURTHER ANALYSIS IN THE TOA EFFORT.
DES/CONSTRAINTS	DESIGN CONSTRAINTS	QUANTITATIVE AND QUALITATIVE SUPPORTABILITY AND SUPPORTABILITY RELATED DESIGN CONSTRAINTS BASED ON EXISTING LOGISTICS RESOURCES AND RISKS IDENTIFIED USING EXISTING MANPOWER AND PERSONNEL.
EFF/TRG/REQ	EFFECT OF TRAINING REQUIREMENTS	THE EFFECT OF TRAINING REQUIREMENTS FROM THE TRAINING TRADEOFF ANALYSIS IS THE OUTPUT FROM AN IMPACT ASSESSMENT AND IS UTILIZED AS INPUT TO THE SUBSEQUENT PROCESS OF DETERMINING THE OPTIMUM TRAINING SOLUTION FOR THE NEW SYSTEM/EQUIPMENT. THE EFFECTS CAN BE AT THJE SAME LEVEL TO ESTABLISH TRAINING CONCEPTS IN THE EARLIER ACQUISITION PROGRAM PHASES OR TO DEFINE SPECIFIC TRAINING RESOURCE REQUIREMENTS AND DATA PRODUCTS FOR IDENTIFIED HARDWARE, SOFTWARE, AND SUPPORT SYSTEMS.
HDM/GUIDE/DATA	HARDMAN GUIDE DATA	THIS DATA FLOW CONTAINS DATA RELATING TO PROBLEM DEFINITION, REQUIREMENTS ANALYSIS, AND ANALYSIS SUPPORT INFORMATION TO HELP IDENTIFY CRITICAL MANPOWER, PERSONNEL AND TRAINING REQUIREMENTS OF THE EMERGING SYSTEM.
HIGH DRIVERS	HIGH DRIVERS	OPERATING AND MAINTENANCE TASKS WHICH ARE OR WOULD BE COSTLY IN TRAINING RESOURCES, SUCH AS QUANTITY OF PERSONNEL REQUIRING TRAINING, THE SOLDIER'S QUALIFICATIONS, TIME TO TRAIN, AND/OR PERFORMANCE DIFFICULTY.

Name	Label	Description
HNDBK/MANPNT	HNDBK QUANT-ITATIVE ANAL OF MANPRINT CNSIDERAT'NS IN ARMY SYS	THE METHODOLOGY FOR MANPOWER AND PERSONNEL INTEGRATION CONTINUOUS AND COMPREHENSIVE EVALUATION (MANPRINT C2E). PRODUCES SYSTEM PERFORMANCE ANALYSES; JOB DESIGN ANALYSES; AND TRAINING DESIGN ANALYSES. LEADS TO PRODUCTION OF PROTOTYPES..
IMPACT/MANP	IMPACT ON EXISTING MANPOWER & PERSONNEL	ACRONYM: LSA - LOGISTIC SUPPORT ANALYSIS INPUT TO THE JOB DESIGN PROCESS REGARDING QUALIFICATIONS AND SUITABILITY OF EXISTING PERSONNEL AND MANPOWER IDENTIFIED FROM LSA TASK 202, MISSION HARDWARE, SOFTWARE AND SUPPORT SYSTEM STANDARDIZATION, WHICH IDENTIFIES RISKS ASSOCIATED WITH USING EXISTING PERSONNEL AND MANPOWER.
INIT/ACT	INITIATE ACTION	THE AUTHORITY TO INITIATE EFFORTS INVOLVED IN LSA TASK 303.2.6, TRAINING TRADE OFF ANALYSIS, IS NORMALLY PROVIDED BY THE PROJECT MANAGER AND/OR THE ILS MANAGER WITH RESPONSIBILITY FOR THE ASSIGNED MATERIEL ACQUISITION PROGRAM.
JOB/DES/DATA	JOB DESIGN DATA	IDENTIFICATION AND ACCUMULATION OF INFORMATION INDICATING TYPE AND SKILL LEVEL OF REQUIRED PERSONNEL AND THE LEVEL OF TRAINING THEY WILL REQUIRE TO OPERATE AND SUPPORT THE SYSTEM/EQUIPMENT UNDER CONSIDERATION.
MAINT/ASSIGN	MAINTENANCE LEVEL ASSIGNMENT	ACRONYM: LSA - LOGISTIC SUPPORT ANALYSIS THE MAINTENANCE LEVEL AT WHICH SPECIFIC MAINTENANCE FUNCTIONS/TASKS WILL BE PERFORMED AS PROVIDED AS OUTPUT FROM LSA TASK 401, TASK ANALYSIS.
MAINT/DATA	MAINTENANCE DATA	SPECIFIC AREAS OF MAINTENANCE INFORMATION PERTAINING TO DIAGNOSTICS, LEVEL OF REPAIR, MAINTENANCE AND RELIABILITY FACTORS, AND MAINTENANCE FUNCTION AND PERFORMANCE IDENTIFICATION.
MAN/PER/RQMNTS	MANPOWER & PERSONNEL REQUIREMENTS	ACRONYM: LSA - LOGISTIC SUPPORT ANALYSIS OUTPUT FROM LSA TASK 303.2.5, MANPOWER AND PERSONNEL TRADE-OFF ANALYSIS, WHICH PROVIDES MANPOWER AND PERSONNEL REQUIREMENT ESTIMATES FOR ALTERNATE SYSTEM/EQUIPMENT CONCEPTS.
MILE/S	MILESTONE SCHEDULED	TAB B OF THE SYSTEM MANPRINT MANAGEMENT PLAN (SMMP) IS THE MILESTONE SCHEDULE WHICH IDENTIFIES WHAT AND WHEN DATA WILL BE REQUIRED TOGETHER WITH KEY EVENTS TO BE ACCOMPLISHED.
O&M/TRG/TEST/DRIVERS	O&M TRAINING TEST DRIVERS	THOSE OPERATIONS AND MAINTENANCE TASK WHICH PLACE A LARGE BURDEN ON EITHER THE NUMBER OF MEN REQUIRED OR THE SKILL LEVEL REQUIRED TO PERFORM O & M FUNCTIONS.

Name	Label	Description
OPT/DIAG	OPTIMUM DIAGNOSTIC CONCEPT	ACRONYM: LSA - LOGISTIC SUPPORT ANALYSIS OUTPUT FROM LSA TASK 303.2.8, DIAGNOSTIC TRADE-OFF ANALYSIS, WHICH PROVIDES THE IDENTIFED OPTIMUM DIAGNOSTIC CONCEPT FOR EACH SYSTEM/EQUIPMENT ALTERNTIVE, AND IS INPUT TO THE MAINTENANCE CONCEPT PROCESS.
OPT/TRNS/PER	OPTIMUM TRAINING & PERSONNEL JOB DESIGN	RESULTS FROM THE TRAINING TRADE-OFF ANALYSIS PROVIDES OPTIMUM SOLUTIONS INCLUDING TRAINING MIXES AND JOB DUTIES WITHIN JOB CLASSIFICATIONS. DATA IS UTILIZED AS INPUT TO LSA TASK 303.2.9, COMPARATIVE EVALUATIONS BETWEEN SUPPORTABILITY, COST, AND READINESS PARAMETERS OF THE NEW SYSTEM EQUIPMENT AND EXISTING COMPARATIVE SYSTEM/EQUIPMENT.
OUT/ANAL/TECH	OUTPUT - ANALYSIS TECHNIQUES FOR TRAINING TOA	ACRONYM: TOA - TRADE-OFF ANALYSIS RESULTS OF THE PROCESS TO SELECT THE TECHNIQUE, MODEL, OR METHODOLOGY TO BE USED FOR CONDUCTING THE TRAINING TRADE-OFF ANALYSIS (TOA).
OUT/TO/AREAS	OUTPUT - TRADE-OFF AREAS FOR TRAINING TOA	RESULTS OF THE PROCESS TO SELECT TRADE-OFF AREAS WHICH ARE UTILIZED AS INPUT TO THE TRAINING TRADE-OFF ANALYSIS.
OUTPUT/ANAL TECH	OUTPUT - ANALYTICAL TECHNIQUES	THE ANALYTICAL TECHNIQUE SELECTED FROM PROCESS 303.2.6.4 IS UTILIZED EACH TIME A TRAINING TRADE OFF ANALYSIS IS PERFORMED AND CAN VARY DEPENDING ON THE MATERIEL ACQUISITION PHASE AND THE INPUT AVAILABLE, AS WELL AS RESULTS DESIRED.
OUTPUT/EVAL/CRIT	OUTPUT - EVALUATION CRITERIA	ACRONYM: TOA - TRADE-OFF ANALYSIS EVALUATION CRITERIA SELECTED FOR TRAINING TOA IS BASED ON RESULTS OF ACTIONS AND ANALYSES OF AVAILABLE INPUTS TO EACH OF THE IDENTIFIED FUNCTIONS.
OUTPUT/TRNG PARA	OUTPUT - TRAINING PARAMETERS	THE OPTIMUM SOLUTION FROM THE TRAINING TRADE-OFF ANALYSIS PROVIDES TRAINING PARAMETERS. THOSE PARAMETERS COMBINED WITH DESIGN AND SUPPORT PARAMETERS FROM LSA TASK 303.2.4 PROVIDE INDICATIONS OF SYSTEM READINESS.
PER/CLASSF	JOB & TASK INVENTORY - PERSON'L JOB CLASSIF'TION	ACRONYM: MOS - MILITARY OCCUPATIONAL SPECIALITY JOBS PERFORMED BY EACH MOS DESIGNATION, ENTRY LEVEL CHARACTERISTICS FOR EACH SPECIALTY, JOB DESCRIPTION OF MAJOR DUTIES AT DIFFERENT SKILL LEVELS, AND TASKS TRAINED DURING THE VARIOUS TRAINING LEVELS AND LOCATIONS.

Name	Label	Description
RECO/REPR/LVL	RECOMMENDED REPAIR LEVEL	OUTPUT FROM LSA TASK 303.2.7, LEVEL OF REPAIR ANALYSIS, WHICH PROVIDES THE MAINTENANCE LEVEL ASSIGNED FOR REPAIR OR REPLACEMENT OF EACH FAILED HARDWARE ITEM.
RECOM/SUPP	RECOMMENDED SUPPORT SYS & NEW/CRIT'L LOG SPT RQT	OUTPUT FROM LSA TASK 303.2.2, SUPPORT SYSTEM TRADE-OFF ANALYSIS,WHICH RESULTS IN A RECOMMENDED SUPPORT SYSTEM FOR EACH SYSTEM/EQUIPMENT ALTERNATIVE AND IDENTIFIES TRAINING-RELATED NEW OR CRITICAL SUPPORT RESOURCE REQUIREMENTS.
RECOM/SYS/EQP/	RECOMMENDED SYSTEM/EQUIP	ACRONYM: LSA - LOGISTIC SUPPLY ANALYSIS OUTPUT FROM LSA TASK 303.2.3, SYSTEM TRADE-OFF ANALYSIS, WHICH PROVIDES THE RECOMMENDED CONFIGURATION SYSTEM/EQUIPMENT HARDWARE AND SOFTWARE.
ROC PARA 7	SYSTEM SUPPORT REQUIREMENTS - ROC PARA 7	PARAGRAPH 7 OF THE REQUIRED OPERATIONAL CAPABILITY (ROC) REQUIREMENTS DOCUMENT SUPPORTS FULL-SCALE DEVELOPMENT OF THE MATERIEL ACQUISITION PROGRAM AND STATES CONCISELY THE SUPPORT SYSTEM REQUIREMENTS.
ROC/APP4	TRAINING DEVICE RQMNT FROM ROC, APPX 4	APPENDIX 4 OF THE ROC WHICH ADDRESSES REQUIREMENTS FOR DEVELOPMENT OF TRAINING DEVICES IN CONJUNCTION WITH A NEW SYSTEM/EQUIPMENT.
SEL/ANAL TECH/INPUT	SELECTED T.O. INPUT ANALYSIS TECHNIQUES	ACRONYM: TOA - TRADE OFF ANALYSIS ANALYSIS TECHNIQUES AVAILABLE FOR TRAINING T.O.A. INCLUDE: ARMY HARDWARE VERSUS MANPOWER COMPARABILITY ANALYSIS (HARDMAN), TRAINING EFFECTIVENESS ANALYSIS (TEA), AND MANPOWER & PERSONNEL INTEGRATION CONTINUOUS AND COMPREHENSIVE EVALUATION (MANPRINT C2E).
SEL/ANAL/TECH	SELECTED ANALYSIS TECHNIQUES	TECHNIQUES THAT CAN BE UTILIZED TO PERFORM A TRAINING TRADEOFF ANALYSIS. THERE MUST BE ASSESSED TO DETERMINE THE MOST APPLICABLE AND EFFECTIVE TECHNIQUES.
SEL/EVAL CRIT/INPUT	SELECTED T.O. INPUT EVALUATION CRITERIA	EVALUATION CRITERIA FOR TRAINING TRADE-OFF ANALYSIS (TOA) INPUT INCLUDES CONSIDERATION OF DESIGN CONSTRAINTS, SUPPORT SYSTEM AND TRAINING REQUIREMENTS, AND IDENTIFIED OPERATION AND MAINTENANCE TASK HIGH DRIVERS.
SEL/EVAL/CRIT	SELECTED EVALUATION CRITERIA AREA	THE CRITERIA TO BE USED DURING A TRAINING TRADE-OFF ANALYSIS IS ONE OF THREE PROCESSES, TOGETHER WITH TRADE-OFF AREAS AND ANALYTICAL TECHNIQUE SELECTED. WITHIN THE EVALUATION CRITERIA AREA ARE FOUR PROCESSES ADDRESSING DESIGN CONSTRAINTS, SUPPORT SYSTEM AND TRAINING REQUIREMENTS, AND OPERATING AND MAINTENANCE TASK DRIVERS.
SEL/INP/TRG/TOA	SELECTED INPUTS FOR TRG TRADEOFF ANALYSIS	THIS DATA FLOW CONTAINS THE SELECTED INPUTS FOR TRAINING TRADEOFF ANALYSIS. IT CONTAINS THE EVALUATION CRITERIA, THE POTENTIAL TRADEOFF AREAS TO BE CONSIDERED, AND THE ANALYTICAL TECHNIQUES THAT WILL BE UTILIZED.

Name	Label	Description
SEL/MAN/PER/DATA	SELECTED MANPOWER AND PERSONNEL DATA	SELECTED AREAS OF MANPOWER AND PERSONNEL DATA ARE IDENTIFIED AND ACCUMULATED FOR GENERAL ANALYSIS PURPOSES AND DETERMINATION OF NEW JOB CLASSIFICATION REQUIRING NEW/SPECIAL TRAINING COURSES.
SEL/T.O. AREAS/INPUT	SELECTED T.O. INPUT - TRADE OFF AREAS	ACRONYM: TOA - TRADE OFF ANALYSIS MOS - MILITARY OCCUPATIONAL SPECIALITY TRADE-OFF AREAS FOR TRAINING TOA INPUT INCLUDES: HARDWARE/SOFTWARE CONFIGURATION, THE MAINTENANCE AND TRAINING CONCEPTS, MOS JOB DESIGNS, AND MANPOWER AND PERSONNEL.
SEL/TO/ALT	SELECTED TRADE-OFF ALTERNA-TIVES	SELECTED TRADEOFF ALTERNATIVES ARE OPTIONS WHICH HAVE BEEN IDENTIFIED FOR USE IN A TRAINING TRADEOFF ANALYSIS FROM THE PROCESS OF ESTABLISHING APPLICABLE FEATURES AND CONSIDERATIONS GENERATED BY PRECEEDING PROCESS IN SPECIFIC AREAS OR CATEGORIES.
SEL/TO/AREAS	SELECTED TRADE-OFF AREAS	AREAS WHICH HAVE AN IMPACT ON THE TRAINING TRADE-OFF ANALYSIS, AND MUST BE EVALUATED TO DETERMINE AND IDENTIFY APPLICABLE DATA.
SEL\EVAL\CRIT	SELECTED EVALUATION CRITERIA AREA	SELECTED EVALUATION CRITERIA CONSISTS OF QUANTITATIVE AND QUALITATIVE DATA AND PARAMETERS FROM THE PRECEDING FOUR PROCESSES WHICH IMPACT ON TRAINING REQUIREMENTS AND WHICH THEREFORE MUST BE UTILIZED IN THE TRAINING TRADE-OFF ANALYSIS.
SKL/PERF	SKILLS TO PERFORM	THIS DATA FLOW DESCRIBES THE OPERATOR AND MAINTAINER SKILLS REQUIRED FOR OPERATING AND MAINTAINING THE SYSTEM UNDER ANALYSIS.
SPT/TEST/EVAL	SUPPORT'LITY TEST AND EVALUATION	OPTIMUM TRAINING REQUIREMENTS AND RECOMMENDATIONS MUST BE PROVIDED AS INPUT TO LSA TASK 501, SUPPORTABILITY TEST AND EVALUATION FOR TEST PLANS, SUPPORTABILITY ASSESSMENT PLAN, AND USER TEST COORDINATION.
SUM/OUTPUT/ANAL/TECH	SUMMARY OUTPUT FROM ANALYSIS TECHNIQUES	RESULTS FROM THE ASSESSMENT OF PURPOSE AND OBJECTIVES FOR ALL IDENTIFIED TRAINING TRADEOFF ANALYSIS TECHNIQUES.
SUP/DSN/CONSTRNT	SUPPORTA'ITY DESIGN CONSTRAINTS	SUPPORTABILITY DESIGN CONSTRAINTS BASED ON USING EXISTING LOGISTIC SUPPORT RESOURCES OBTAINED AS OUTPUT FROM LSA TASK 202, HARDWARE, SOFTWARE AND SUPPORT SYSTEM STANDARDIZATION.
SUP/DSN/FACTORS	SUPPORT'LITY & SUPPORT'TY RELATED DESIGN FACTORS	THE TRAINING TRADE-OFF ANALYSIS RESULTS MAY REQUIRE SPECIFIC SUPPORTABILITY CHARACTERISTICS FOR THE SYSTEM/EQUIPMENT DESIGN, AS WELL AS QUANTITATIVE AND/OR QUALITATIVE DESIGN CONSTRAINTS TO SATISFY TRAINING REQUIREMENTS. IF APPLICABLE, THESE FEATURES MUST BE PROVIDED AS INPUT TO LSA TASK 205, SUPPORTABILITY AND SUPPORTABILITY-RELATED DESIGN FEATURES.
SUP/DSN/FTR	SUPPORTABIL-ITY DESIGN FACTORS	SUPPORTABILITY AND SUPPORTABILITY RELATED DESIGN FACTORS AND CONSTRAINTS OBTAINED AS OUTPUT FROM LSA TASK 205.2.3, SPECIFICATION REQUIREMENTS, INCLUDING QUANTITATIVE AND QUALITATIVE SUPPORT RESOURCE REQUIREMENTS.

Name	Label	Description
SUP/SYS/REQ	SUPPORT SYSTEM REQUIREMENTS	ASPECTS OF THE SUPPORT SYSTEM WHICH HAVE AN IMPACT ON TRAINING DUE TO INNOVATIVE SUPPORT CONCEPTS, SUPPORT DRIVERS AND UNIQUE FUNCTIONAL REQUIREMENTS.
TASK/REQ/SCH/RESP	TASK RQMNTS, SCHEDULE & RESPONS'LITY	LSA TASK 102, LOGISTIC SUPPORT ANALYSIS PLAN (LSAP) SPECIFIES WHETHER LSA TASK 303.2.6 DESCRIBED IN MIL-STD-1388-1A IS REQUIRED, AS WELL AS THE ORGANIZATIONAL UNIT RESPONSIBLE FOR TASK PERFORMANCE AND HOW THE TASK WILL BE PERFORMED. IN ADDITION, A MILESTONE SCHEDULE IS INCLUDED, ALONG WITH IDENTIFICATION OF ALL ITEMS WHICH WILL BE COVERED BY THE ANALYSIS EFFORT.
TOA RESULTS	TRADE OFF ANALYSIS RESULTS	RESULTS FROM CONDUCTING THE TRAINING TRADE-OFF ANALYSIS CONSIST OF A SET OF TRAINING VALUES AND FEATURES WHICH REFLECT THE SELECTED ALTERNATIVES AND ARE USED AS INPUT TO DETERMINE THE OPTIMUM TRAINING SOLUTION.
TRAD/PAM350-4	TRADOC PAM 350-4	ACRONYM: TEA - TRAINING EFFECTIVENESS ANALYSIS REQUIREMENTS AND PROCEDURES FOE CONDUCTING A TRAINING EFFECTIVENESS ANALYSIS (TEA).
TRAIN/STRAT	TRAINING STRATEGY, GOALS, & CONSTRAINTS	ACRONYM: SMMP - SYSTEM MANPRINT MANAGEMENT PLAN INFORMATION FROM PARAGRAPH 3A OF THE SYSTEM MANPRINT MANAGEMENT PLAN (SMMP) INCLUDING TRAINING LOCATIONS FOR CRITICAL TASKS, LENGTH OR DURATION OF INSTITUTIONAL TRAINING COURSES, UNIT TRAINING TIMES, AS WELL AS APPLICABLE MANPOWER, PERSONNEL, AND HUMAN FACTOR ENGINEERING, GOALS AND CONSTRAINTS.
TRG/REQ	TRAINING REQUIREMENTS	TRAINING REQUIREMENTS ARE RESULTS OBTAINED FROM A TRAINING TRADEOFF ANALYSIS AND CONSIST OF A SET OF TRAINING VALUES AND FEATURES WHICH REFLECT THE SELECTED ALTERNATIVES.
TRG/REQ/RATE	TRAINING REQUIREMENTS RATE	CONTAINS QUALITATIVE AND QUANTITATIVEDATA PERTAINING TO THE DETAILED TRAINING REQUIREMENTS OF THE NEW SYSTEM/EQUIPMENT. THESE REQUIREMENTS INCLUDE: (A) TRAINING OBJECTIVES (B) CONSTRAINTS (C) NEED FOR TRAINING DEVICES OR EMBEDDED SYSTEM TRAINING (D) TRAINING STRATEGY
TRNG OBJ	TRAINING OBJECTIVES FROM MNS, ROC & O&O PLAN	ACRONYM: MNS - ROC - REQUIRED OPERATIONAL CAPABILITY O&O PLAN - OPERATIONAL AND ORGANIZATIONAL PLAN TRAINING OBJECTIVES FROM REQUIREMENT DOCUMENTS USED AS GOALS, AND TRAINING CONSTRAINATS DURING SPECIFIC PHASES OF THE MATERIEL ACQUISITION PLAN.

	Name	Label	Description
	TRNG/RQMNT/RECOM	TRAINING REQUIREMENTS & RECOMMEN-DATIONS	THE TRAINING REQUIREMENTS AND RECOMMENDATIONS FROM THE TRAINING TRADE-OFF ANALYSIS ARE USED AS SOURCE DATA FOR LSA TASK 401, TASK ANALYSIS TO IDENTIFY NEW OR CRITICAL LOGISTIC SUPPORT RESOURCES, INCLUDING TRAINING DEVICES, AND SPECIFICALLY LSA TASK 401.2.4, TO IDENTIFY THE BEST MODE OF TRAINING, I.E., FORMAL CLASSROOM, ON-THE-JOB TRAINING, OR A COMBINATION OF BOTH.
	TRNG/RQMNT/TRNG/MODE	TRAINING REQUIREMENTS & MODE OF TRAINING	TRAINING REQUIREMENTS, INCLUDING TRAINING PROGRAMS OBTAINED FROM THE TRAINING ANALYSIS AS A PART OF LSA TASK 401, TASK ANALYSIS.
	UNIQUE FUNCTIONS	UNIQUE FUNTIONS & TASKS	OPERATOR AND MAINTENANCE FUNCTIONS AND SPECIFIC TASKS TO ACCOMPLISH THE FUNCTIONS WHICH ARE UNIQUE TO THE NEW SYSTEM AND REQUIRE TRAINING RESOURCES OBTAINED AS OUTPUT FROM LSA TASK 301, FUNCTIONAL REQUIREMENTS IDENTIFICATION.

	Name	Label	Description
	AAF	ACQUIRING ACTIVITY FILE	CONTAINS THOSE RECORDS, DOCUMENTS, DECISION PAPERS, SCHEDULES THAT WERE PREPARED AS PART OF THE ACQUISITION INITIATION, JUSTIFICATION, AND PLANNING PRIOR TO THE ASSIGNMENT OF A PROGRAM MANAGER. THE ITEMS IN THIS DATA STORE INCLUDE: A. THREAT ANALYSIS DATA B. O&O PLAN C. READINESS OBJECTIVES DATA D. FUNTIONAL REQUIREMENTS DATA E. PROJECTED SCHEDULE DATA F. LOGISTICS RESOURCES DATA G. DESIRED R&M PARAMETERS H. TOA I. TOD J. COST & OPERATIONAL EFFECTIVENESS ANALYSIS (COEA) DATA K. PROJECTED COST DATA L. MAJOR NEW START (MNS) DATA M. REQUIRED OPERATIONAL CAPABILITY (ROC) DATA.
	ECA	EARLY COMP ANAL	EARLY COMPARABILITY ANALYSIS CONDUCTED TO IDENTIFY TASKS WHICH ARE COSTLY IN MANPOWER, PERSONNEL AND TRAINING RESOURCES IN PREDECESSOR OR REFERENCE SYSTEMS MOST COMPARABLE TO THE SYSTEM UNDER DEVELOPMENT.
	HDM/GUIDE	HARDMAN GUIDE	HARDMAN COMPARABILITY METHODOLOGY GUIDE, APRIL 1985: VOL I, MANAGER'S GUIDE; VOL II, PROBLEM DEFINITION; VOL III, REQUIREMENTS ANALYSIS; VOL IV, INTERPRETATION AND EVALUATION; VOL V, ANALYSIS SUPPORT INFORMATION.

Name	Label	Description
P/F	POLICY FILES	CONTAINS THOSE MILITARY PUBLICATIONS, DECISION PAPERS, MISSIONS & FUNCTIONS, etc, WHICH ARE NEEDED TO ESTABLISH THE LOGISTICAL SUPPORT AND REVIEW REQUIREMENTS OF THE ITEM/EQUIPMENT DEVELOPMENT PROGRAM. THIS DATA STORE INCLUDES: 1. AR 700-127 ILS 2. MIL-STD 881A (FB) 3. MIL-STD 1388-1 LSA 4. MIL-STD 1388-2 LSAR 5. MIL-STD 152 TECH REVIEW GUIDELINES 6. DA PAM 700-28 ILS REVIEW GUIDELINES 7. MIL-STD 810 ENVIRONMENTAL TEST METHODS 8. MIL-STD 781 RELIABILITY DESIGN GUIDED 9. MIL-STD 2108 CLIMATIC EXTREMES FOR MIL EQUIPMENT 10. AR 70-38 ILS PREPARATION 11. MIL-STD 470, 471 MAINTAINABILITY STANDARDS 12. AMC PAM 700-4 LOGISTICS TECHNIQUES (WITH PALMAN) 13. DA PAM 700-28, "INTEGRATED SUPPORT PROGRAM ASSESSMENT ISSUES AND CRITERIA" 14. MIL-STD-780, CODING SYSTEM 15. MIL-STD-882, 16. MIL-STD-1629, PROCEDURES FOR FMECA 17. MIL-STD-756, RELIABILITY MODELING & PREDICTIONS 18. DI-S-3604, FUNCTIONAL FLOW DIAGRAM 19. MIL-M-24100B, FOMM 20. AR 725-50, REQUISITIONING, RECEIPT AND ISSUE SYSTEM 21. DI-R-7112, MAINTAINABILITY DEMONSTRATION TEST PLAN 22. DI-R-2129, MAINTAINABILITY DEMONSTRATION PLAN 23. DI-R-7113, MAINTAINABILITY DEMONSTRATION REPORT 24. DI-R-7109, MAINTAINABILITY ANALYSIS REPORT 25. DI-R-7105, DATA COLLECTION, ANALYSIS AND CORRECTIVE ACTION SYSTEM REPORTS 26. DI-R-7085, FAILURE MODE, EFFECTS AND CRITICALITY ANALYSIS REPORT 27. DI-R-7110, MAINTAINABILITY DESIGN CRITERIA PLAN 28. DI-R-7107, MAINTAINABILITY ALLOCATIONS REPORT 29. DI-R-7106, MAINTAINABILITY MODELLING REPORT 30. DI-R-7108, MAINTAINABILITY PREDICTIONS REPORT 31. MIL-HDBK-472, MAINTAINABILITY PREDICTION 32. DI-R-7111, INPUTS TO THE DETAILED MAINTENANCE PLAN AND LOGISTICS SUPPORT ANALYSIS 33. DI-R-2130A, MAINTAINABILITY DEMONSTRATION REPORT 34. MIL-STD-785B, RELIABILITY PROGRAM FOR SYSTEMS AND EQUIPMENT 35. DI-R-7079, RELIABILITY PROGRAM PLAN 36. DI-R-7080, RELIABILITY STATUS REPORT 37. DI-R-7041, FAILURE SUMMARY AND ANALYSIS REPORT 38. DI-R-7081, RELIABILITY MATHEMATICAL MODEL(S) 39. DI-R-2114, RELIABILITY ALLOCATION REPORT 40. DI-R-7082, RELIABILITY PREDICTIONS REPORT 41. DI-R-1734, FAILURE MODES, EFFECTS, AND CRITICALITY REPORT 42. DI-R-2115A, FAILURE MODE AND EFFECT ANALYSIS REPORT 43. DI-R-7083, SNEAK CIRCUIT ANALYSIS REPORT 44. DI-R-7084, ELECTRONIC PARTS/CIRCUITS TOLERANCE ANALYSIS REPORT 45. DI-R-35011, CRITICAL ITEM CONTROL PLAN 46. DI-R-7040, BURN-IN TEST REPORT 47. DI-R-7033, RELIABILITY TEST PLAN

Name	Label	Description
		48. DI-R-7035, RELIABILITY TEST AND DEMONSTRATION PROCEDURES 49. DI-R-7034, RELIABILITY TEST AND DEMONSTRATION REPORTS 50. MIL-STD-965, PARTS CONTROL PROGRAM 51. ARC11-201 MOS STRUCTURE
SMMP	SYS MANPRINT MGMT PLAN	SYSTEM MANPRINT MANAGEMENT PLAN INITIATED BY THE COMBAT OR TRAINING DEVELOPER TO SERVE AS A MANAGEMENT AND PLANNING GUIDE AND AN AUDIT TRAIL TO IDENTIFY AND ADDRESS MANPRINT ISSUES AND CONCERNS DURING THE MATERIEL DEVELOPMENT AND ACQUISITION PROCESS.
SMMP TAB	SMMP TAB C	ACRONYM: SMMP - SYSTEM MAMPRINT MANAGEMENT PLAN TASK DESCRIPTIONS WITHIN SYSTEM MANPRINT MANAGEMENT PLAN (SMMP).
SMMP,TAB B	TAB B, SMMP	TAB B OF THE SYSTEM MANAGEMENT MANPRINT PLAN (SMAP) IS THE MILESTONE SCHEDULE WHICH IDENTIFIES WHEN DATA WILL BE REQUIRED DURING THE MATERIEL ACQUISITION PROGRAM AND WHEN KEY EVENTS ARE TO BE ACCOMPLISHED.

	Name	Label	Description
	PM/ILSMT	PROGRAM MANAGER & ILSM TEAM	THE REQUIRING AUTHORITY WITH ASSIGNED RESPONSIBILITY FOR THE SPECIFIC MATERIEL ACQUISITION PROGRAM INCLUDING A SYSTEM OR EQUIPMENT.

ANNEX C
STRUCTURED DESIGN

—

LSA SUBTASK 303.2.6
DESIGN, OPERATIONS & TRAINING

LSA 303.2.6
DESIGN, OPERATIONS & TRAINING
TRADE-OFF ANALYSIS

PROCESS 303.2.6.1 - Select Trade-Off Inputs

PURPOSE:

The selection of inputs for training trade-off analysis, including determination of evaluation criteria, potential trade-off areas, and the analytical technique(s) that will be utilized.

PROCEDURE:

1. Ensure that a requirement has been established by the requiring authority (Assigned Project Manager or Integrated Logistic Support Manager) to conduct a Training Trade-Off Analysis and is included in the Logistic Support Analysis Plan (LSAP) prepared under LSA Task 102.

2. Establish coordination and procedures with the organizational unit designated in the LSAP who is responsible for performing the analysis to ensure that requirements of the LSAP will be met concerning the Training Trade-Off Analysis requirements and the identification of all items which are to be covered by the analysis effort.

3. Schedule the planned start and completion of the Training Trade-Off Analysis to conform to the milestone schedule contained in Tab B of the System Manprint Management Plan (SMMP).

   a. Determine the manpower required to accomplish the analysis within the scheduled time.

   b. Determine other resources required: work space and location; secretarial/administrative support; automation support.

4. Plan to obtain the required evaluation criteria and parameters necessary to conduct the Training Trade-Off Analysis in accordance with Process 303.2.6.2.

   a. Review documentation concerning the system being developed.

   b. Compare potential evaluation criteria for the training trade-off analysis with those established for similar systems.

TRAINING TRADE-OFF RESOURCE WORKSHEET
(PROCESS 303.2.6.1)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Begin Task: _____

Complete Task: _____

Resource Requirements

Manpower

_____Man Mo.

Workspace

_____sq ft

Secretarial/Admin

_____Man Mo.

Automation

_____ PC Equivalents

c. Identify potential trade-off evaluation criteria for in-depth analysis under Task 303.2.6.2A1.

5. Determine the potential trade-off areas that would have an effect on the Training Evaluation and Trade-Off Analysis in accordance with Process 303.2.6.3.

a. Review training evaluations and trade-off analyses which have been accomplished for other systems to determine which areas of the training plan offer the most trade-off potentials (e.g., contractor training vs government; school courses vs on-the-job training; training simulators/devices vs actual equipment.)

b. Review appropriate regulations and guidance documents (e.g., textbooks) to assist in the selection of trade-off areas.

6. Evaluate approved analytical techniques in accordance with Process 303.2.6.4 to select the most applicable for the best return on investment based on the range and maturity of evaluation criteria and trade-off areas currently available and also on the type and detail of analysis output desired.

7. Establish coordination through the ILS Management Team Members to obtain required inputs for the Training Trade-Off Analysis and to interface the resulting evaluation. Coordination should include the TRADOC training developer as well as organizations responsible for design, reliability, maintainability, Safety, Human Factors Engineering, Cost Estimating, and Functional Representatives for all applicable ILS elements (particularly, New Equipment Training).

PROCESS 303.2.6.2 - DETERMINE EVALUATION CRITERIA

PROCESS 303.2.6.2A1 - Identify Potential Evaluation Criteria

PURPOSE:

To identify the potential evaluation criteria for a training trade-off analysis, including qualitative and quantitative design constraints, the system's support requirements, all established training requirements, as well as any identified operation and/or maintenance tasks which are supportability, cost and/or readiness drivers.

PROCEDURE:

1. Determine qualitative and quantitative data for use as evaluation criteria in the Training Trade-Off Analysis within each of the following areas:

   a. Hardware and Software Design Constraints in accordance with Process 303.2.6.2A2.

   b. Established or planned Support System Requirements in accordance with Process 303.2.6.2A3.

   c. Training Requirements in accordance with Process 303.2.6.2A4.

   d. Operator and Maintenance Tasks or Functions identified as costly in Training Resources (High Drivers) in accordance with Process 303.2.6.2A5.

2. Compare the Evaluation Criteria with an established Baseline Comparison System (BCS) to identify new or unique features and requirements which could impact on Training Resources:

   a. From a review of documentation in the areas listed in 1 above, identify evaluation criteria applicable to the new system. Such criteria may include reliability, availability, and maintainability (RAM) factors, such as mean time to repair (MTTR); mean time between failures (MTBF); and availability (Ao). Evaluate the criteria selected against the Baseline Comparison System (BCS).

   b. After comparison with the BCS, determine the adequacy of current training to achieve the Ao established for the new system in view of the projected MTTR and MTBF. Identify new and unique training requirements to achieve the project Ao.

   c. Using evaluation criteria, determine if potential technological advances indicate that certain training requirements can be reduced or eliminated.

3. If available, review the results from an Early Comparability Analysis (ECA), as follows:

   a. Evaluate results of the review to establish the high support drivers (e.g., manpower/personnel, maintenance requirements, training requirements.)

POTENTIAL EVALUATION CRITERIA WORKSHEET
(PROCESS 303.2.6.2A1)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

1. Potential Training Trade-Off Evaluation Criteria: (as appropriate)

_____RAM factors _____Cost _____Schedule

2. New Training Required to Attain Ao:

Skills to Reduce Ao	Training Resource Requirement
(1) (e.g., electronic trouble shooting)	(1) (e.g., new school course)
(2) (e.g., working with plastics)	(2) (e.g., new publications)
(3) etc.	(3) etc.

3. Technology Induced Training Reductions

Technology Advance	Training Reduction
(1) (e.g., solid state ignition)	(1) (e.g., shorten power-plant mechanics course)
(2) etc.	(2) etc.

4. High Support Drivers Training Impact

High Support Drivers	Training Impact
(1) (e.g., high POL consumption	(1) (e.g., increase input to POL Handler's Courses)
(2) etc.	(2) etc.

b. Determine relationships between high support drivers and training implications.

PROCESS 303.2.6.2A2 - Design Constraints

PURPOSE:

Accumulate established and updated supportability and supportability-related design constraints that can be obtained from LSA Subtask 205.2.3, specification requirements, as well as the documented quantitative and qualitative data in LSAR Data Record A. In addition, check output from LSA Task 202, mission hardware, software and support system standardization for defining supportability design constraints for a new system based on using existing logistic support resources, including training materials/equipment.

PROCEDURE:

1. Determine quantitative and qualitative supportability and supportability-related design constraints by reviewing the following:

a. LSA Subtask 205.2.3, Specification Requirements;

b. Required Operational Capability (ROC) document for the proposed system/equipment;

c. System/equipment specifications;

d. LSA Record (LSAR) Data Record A.

2. Insure that output from LSA Task 202, Mission Hardware, Software, and Support System Standardization, has been incorporated into LSA Subtask 205.2.3 as recommended hardware and software standardization approaches.

3. Insure that the supportability design constraints of the new system/equipment are:

a. based on existing logistic support resources;

b. related to the risks identified with using existing personnel and manpower.

DESIGN CONSTRAINT TRAINING IMPACT WORKSHEET
(PROCESS 303.2.6.2A2)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Design Constraint	Training Impact
(1) (e.g., tank ammo autoloader)	(1) (e.g., eliminate/reduce training of manual ammo handlers)
(2) (e.g., reactive armor)	(2) (e.g., add training for reactive armor removal/ replacement)
(3) etc.	(3) etc.

PROCESS 303.2.6.2A3 - Support System Requirements

PURPOSE:

Determine that support system elements for input into a training trade-off analysis are available from results of LSA Task 302, Support System Concept Alternatives. Obtain the LSA Subtask 302.2.2, Updated Alternative Support Concept that has undergone system trade-offs and addresses drivers and unique functional requirements.

PROCEDURE:

Determine those elements of the proposed support system which have a particular impact on training. Elements of the proposed system may include:

(a) Innovative concepts

(b) Support drivers which have changed when compared to the BCS

(c) Unique functional requirements.

PROCESS 303.2.6.2A4 - Training Requirements

PURPOSE:

Determine training requirements input to the Training Trade-Off Analysis based on training objectives contained in requirements documents, such as the Major New Start (MNS), the O&O Plan, and ROC. Develop qualitative and quantitative data, identifying training requirements.

PROCEDURE:

1. Develop qualitative and quantitative training requirements from the following requirements documents and plans:

a. Training objectives from the Major New Start (MNS)

b. Training constraints including time-to-train limits and requirements for training simulators from paragraph 7 of the Operational and Organizational (O&O) Plan.

PROPOSED SYSTEM TRAINING IMPACTS WORKSHEET
(PROCESS 303.2.6.2A3)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Proposed Support System Training Impacts:

SUPPORT SYSTEM ELEMENT	TRAINING IMPACT
1. Innovative Concepts	
a. (e.g., plastic components)	a. (e.g., training course modification and new publications)
b. etc.	b. etc.
2. Increased/decreased support drivers	
a. (e.g., increases in POL consumption)	a. (e.g., increase input to POL handlers' courses.)
b. etc.	b. etc.
3. Unique functional requirements	
a. (e.g., increase use of built-in diagnostics)	a. (e.g., training courses modified)
b. etc.	b. etc.

TRAINING REQUIREMENTS WORKSHEET
(PROCESS 303.2.6.2A4)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Major New Start (MNS) Training Objectives

_____

_____ (list as appropriate)

O & O Plan, paragraph 7, Training Constraints

_____

_____ (list as appropriate)

O & O Plan, paragraph 7, Simulator Requirements

_____

_____ (list as appropriate)

ROC, paragraph 8 and Appendix 4

(1) Training Device Requirements

_____

_____ (list as appropriate)

(2) Embedded Training Requirements

_____

_____ (list as appropriate)

(continued)

TRAINING REQUIREMENTS WORKSHEET
(PROCESS 303.2.6.2A4)

(concluded)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

System MANPRINT Management Plan (SMMP)

(1) Training Strategy

_____

_____ (list as appropriate)

(2) Training Goals

_____

_____ (list as appropriate)

(3) Constraints

_____

_____ (list as appropriate)

(4) Training Objectives

_____

_____ (list as appropriate)

c. Training assessment and need for training devices and embedded training from paragraph 8 and Appendix 4 of the ROC.

d. Training strategy, goals, and constraints from the System MANPRINT Management Plan (SMMP) and specific training objectives from paragraph 3A of the SMMP.

2. If available, obtain the training analysis from results of LSA Task 401, Task Analysis, which is documented on the following LSAR data records:

a. Data record card, D06, block 7, Personnel Summary.

b. Data record E, Identity and Justification for each new training item.

c. Data record G, Modified/New Skills, which are used to identify requirements for modification or establishment of training programs to provide the modified/new skills.

PROCESS 303.2.6.2A5 - Operation and Maintenance Task Drivers

PURPOSE:

To identify operation and maintenance tasks for the new system which may be or are costly in training resources, using the Early Comparability Analysis (ECA) report, and/or the output from LSA Task 301, "Functional Requirements Identification" (in particular, cost and readiness drivers relating to training and equipment).

PROCEDURE:

1. From the Early Comparability Analysis (ECA), which compares the new system/equipment with a baseline, identify those operation and maintenance tasks which may be or are costly in training resources. These high drivers may be more costly in terms of manpower - the number of persons required for system/equipment operation and maintenance; or they may be more costly in terms of the skill levels required in personnel for O&M. In one case, the training load is quantitatively increased; in the other, the skill levels of instructors or the complexity of simulations must be increased. These high drivers should be identified by components (e.g., power plants, chassis) of the new system/equipment related to military occupational specialties (MOS).

OPERATION AND MAINTENANCE TASK DRIVERS WORKSHEET
(PROCESS 303.2.6.2A5)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Unique Functional Requirement	Resources Required (Compared to Baseline)		
	More	About the Same	Less
Supportability			
Cost			
Readiness Drivers			
Training Staffs			
Training Equipment (Simulations & devices)			

2. From the output of LSA Task 301, Functional Requirements Identification, obtain the unique functional requirements identified as supportability, cost and readiness drivers.

PROCESS 303.2.6.2A6 - Selected Evaluation Criteria

PURPOSE:

Establish the evaluation criteria to be used in the training TOA from those presented in Processes 303.2.6.2A2 through 303.2.6.2A5.

PROCEDURE:

1. Review and select data from each of the following processes which would be applicable to the Training Trade-Off Analysis to be conducted.

a. Process 303.2.6.2A2, Hardware and Software Design Constraints

b. Process 303.2.6.2A3, Support System Requirements

c. Process 303.2.6.2A4, Training Requirements

d. Process 303.2.6.2A5, Operation and Maintenance Tasks and Functions Identified as Costly in Training Resources (High Drivers).

Note that selected evaluation criteria must be compatible with and support the trade-off areas determined by Process 303.2.6.3 and the analytical technique selected from Process 303.2.6.4.

PROCESS 303.2.6.3 - DETERMINE TRADE-OFF AREAS

PROCESS 303.2.6.3A1 - Identify Potential Trade-Off Areas

PURPOSE:

Identification of potential input areas as source data for conducting a training trade-off analysis using hardware and software configurations data, planned or established maintenance and training concepts data, current job design for operator and maintainers data, and manpower and personnel data selected for the new system/equipment.

SELECTED EVALUATION CRITERIA WORKSHEET
(PROCESS 303.2.6.2A6)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Data applicable to the training trade-off analysis from:

(1) Subtask 303.2.6.2A2 -

_____

_____ (list as appropriate)

_____

(2) Subtask 303.2.6.2A3 -

_____

_____ (list as appropriate)

_____

(3) Subtask 303.2.6.2A4 -

_____

_____ (list as appropriate)

_____

(4) Subtask 303.2.6.2A5 -

_____

_____ (list as appropriate)

_____

PROCEDURE:

1. Since a training trade-off analysis is conducted to maximize the results of training (i.e., readiness) while minimizing training resources expended, analyze the following areas to obtain information and data which will contribute to the accomplishment of the Training Trade-Off Analysis:

a. Hardware and software configurations: SSA Process 303.2.6.3A2.

b. The planned or established maintenance concept: SSA Process 303.2.6.3A3.

c. The training concept: SSA Process 303.2.6.3A4.

d. Established job designs from SSA Process 303.2.6.3A5.

e. Manpower and personnel estimated in LSA Task 303.2.5 to operate and support the new system/equipment as identified in SSA Process 303.2.6.3A6.

2. Determine the maturity of data within each trade-off area (i.e., estimated or planned versus established data) which may be used to impact on design and operation early in the materiel acquisition process. Target these areas for further sensitivity analysis in order to optimize the support system.

3. Assign higher priorities to specific elements within each trade-off area which:

a. Are related to previously identified high training resource drivers or high training demands.

b. Provide the greatest potential and opportunity to reduce training resources and/or demand.

c. Are feasible and could be readily implemented if determined to be cost effective.

PROCESS 303.2.6.3A2 - Hardware and Software Configuration

PURPOSE:

The determination of the latest system/equipment hardware and software alternative configurations for input into a training trade-off analysis and identification of operator and support personnel requirements.

HARDWARE AND SOFTWARE CONFIGURATION
WORKSHEET
(PROCESS 303.2.6.3A2)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

(1) Type of system/equipment: hardware_____

software_____

(2) Essential performance characteristics:

Size _____ Speed/rate _____ Capacity _____

(3) Supportability:

Supply requirements _____

Maintenance requirements _____

(4) Schedule:

Contract initiation _____

First item delivered _____

Program completion _____

(5) Readiness:

Category _____

(6) Cost:

Acquisition _____

Operation and maintenance _____

PROCEDURE:

From the results of LSA Subtasks 302.2.2, "Updated Support System Alternatives", 302.2.3/4, "Alternative System Support Plan", and 303.2.3, "System Trade-Off Analysis, obtain the latest recommended system/equipment alternative. Enter the following factors on the worksheet provided: cost, schedule, performance, readiness, and supportability. Each Subtask should be repeated when new operation nd maintenance requirements are further defined.

PROCESS 303.2.6.3A3 - Maintenance Concept

PURPOSE:

To determine, from the maintenance concept and resultant Maintenance Plan, the requirements and conditions under which support personnel must perform assigned responsibilities with necessary skills provided by training programs.

PROCEDURE:

Obtain the planned or established Maintenance Concept and the Maintenance Plan for the new system/equipment from the results of the following LSA tasks/subtasks.

a. LSA Task 201, "Use Study", which provides allowable maintenance periods designated as:

   (1) MTTR - mean time to repair
   (2) MTBF - mean time between failures
   (3) ALDT - administrative and logistic delay time
   (4) Ao - operational availability
   (5) RTAT - repair turnaround time

b. LSA Subtasks 302.2.1, "Support System Alternatives" and 302.2.3, "Alternative System Support Plans" which provide data on the amount and type of logistic resources required to support the system at each maintenance level.

c. LSA Subtask 303.2.7, Level of Repair Analysis, which assigns the maintenance level at which end items or components will be repaired or replaced.

d. LSA Subtask 303.2.8, Diagnostic Trade-Off Analysis, which identifies the optimum diagnostic concept for each new system/equipment alternative under consideration.

MAINTENANCE CONCEPT WORKSHEET
(PROCESS 303.2.6.3A3)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

A. MAINTENANCE FACTORS:

(1) MTTR: _____ (2) MTBF: _____ (3) ALDT: _____

(4) Ao: _____ (5) RTAT: _____

B. LEVEL OF REPAIR:

	ORGANIZATION	INTERMEDIATE	DEPOT
(COMPONENT #1)			
(COMPONENT #2)			
(COMPONENT #3)			
(ETC.)			

C. DIAGNOSTICS:

	BUILT IN TEST (BIT)	OFF LINE TEST	MANUAL	AUTO CONNECTING POINTS
(COMPONENT #1)				
(COMPONENT #2)				
(ETC.)				

D. MAINTENANCE FUNCTIONS AT LEVELS:

FUNCTION	ORG.	INTERMEDIATE	DEPOT
(1ST MAINT. FUNCTION)			
(2ND MAINT. FUNCTION)			
(ETC.)			

Diagnostics include:

(1) built-in-test (BIT)
(2) off-line-test
(3) manual testing
(4) automatic testing
(5) connecting points for testing.

e. LSA Task 401, Task Analysis, which provides the maintenance functions and tasks, and the maintenance level at which they are to be performed.

PROCESS 303.2.6.3A4 - Training Concept

PURPOSE:

From the training concept normally developed and documented by the training developer with TRADOC, training strategies, goals, and constraints contained in Paragraph 3A of the System MANPRINT Management Plan (SMMP) are identified and documented.

PROCEDURE:

1. From paragraph 3A of the System MANPRINT Management Plan (SMMP), obtain data on planned or established training strategies, goals, and constraints. Data may include location of critical task training, institutional training course length or duration, and unit training time.

2. Obtain additional MANPRINT goals from paragraph 3A of the SMMP concerning manpower, personnel, and human factors engineering which could impact the training concept.

PROCESS 303.2.6.3A5 - Job Design

PURPOSE:

To establish and record a description of the job design for intended operator and support personnel designated for the new system/ equipment for input into a training trade-off analysis.

PROCEDURE:

1. For the personnel designated to operate and support the new system/equipment, obtain a description and determination of the Job Designs from policy files that contain the job and task

TRAINING CONCEPT WORKSHEET
(PROCESS 303.2.6.3A4)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

TRAINING STRATEGIES:

(NARRATIVE)

TRAINING GOALS:

(LIST)

TRAINING CONSTRAINTS:

(LIST)

CRITICAL TASK TRAINING:

INSTITUTION: _____

COURSE NAME	LENGTH
(LIST)	

UNIT TRAINING TIME: _____ MAN-WEEKS

TRAINING IMPACTS

CATEGORY	IMPACT	EFFECT ON TNG
MANPOWER		
PERSONNEL		
HUMAN FACTORS ENGINEERING		

JOB DESIGN WORKSHEET
(SHEET I OF II)
(PROCESS 303.2.6.3A5-I)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

MOS	OPERATIONAL TASK	SUPPORT	JOBS (BRIEF TITLE)	ENTRY LEVEL	TRAINING	SECURITY CLEARANCE
1. XXXA	a. 1st Task Descr. b. 2nd Task Descr. c. etc.		a. b. c.	a. E-2 b. E-3 c. etc.	a. AIT b. AIT c. etc.	a. None b. C c. etc.
2. XXXB	a. 1st Task b. 2nd Task c. etc.		a. b. c.	a. E-3 b. E-3 c. etc.	a. A-NCO b. AIT c. etc.	a. S b. C c. etc.
3. XXXC		a. 1st Task b. 2nd Task c. etc.	a. b. c.	a. E-1 b. E-3 c. etc.	a. OJT b. A-NCO c. etc.	a. None b. None c. etc.
4. etc.						

Legend: AIT = Advanced Individual Training
A-NCO-Edv NCO Training
OJT - Unit Training

JOB DESIGN WORKSHEET
(SHEET II OF II)
(PROCESS 303.2.6.3A5-II)

MOS	SKILL LEVEL	MAJOR DUTIES
1. XXXA	a. E1/2	a. (List duties at Skill Level E1/2)
	b. E3/4	b. (List duties at Skill Level E3/4)
	c. E5/6	c. (List duties at Skill LEvel E5/6)
2. XXXB	a. etc.	a. etc.

inventory for personnel job classifications. For each applicable Military Occupational Specialty (MOS), obtain the following:

a. Jobs performed in the specialty

b. Entry level characteristics

c. Special information such as security clearance requirements

d. Job description of major duties at various skill levels

e. Tasks training during advanced individual training, advanced NCO education, and unit training.

2. Obtain information form LSA Task 202, Mission Hardware, Software, and Support System Standardization, on existing/planned personnel skill levels and quantities, and the identified risks associated with using the existing personnel manpower.

PROCESS 303.2.6.3A6 - Manpower and Personnel

PURPOSE:

Identify information on the required manpower (numbers of people) and personnel (types of skills) for input to the Training Trade-Off Analysis.

PROCEDURE:

1. Obtain personnel requirements, job classification, skill levels, and experience requirements for the selected system/equipment from results of LSA Subtask 303.2.5, Manpower and Personnel Trade-Off Analysis.

2. From the results of LSA Task 401, Task Analysis, if available, obtain the following information.

a. Identified skills for each step in the sequential task description as documented on LSAR Data Record D.

b. New or modified skill requirements detailed on LSAR Data Record G when identified skills are not capable of performing the tasks based on their current training program.

MANPOWER & PERSONNEL WORKSHEET
(PROCESS 303.2.6.3A6)

NAME OF END ITEM: _____

NOMENCLATURE: _____

PART NUMBER: _____

Personnel Required (Enter number per system/equip)
(Obtain from 303.2.5)

Officers:	_____	0 - 6
	_____	0 - 5
	_____	0 - 4
	_____	0 - 3
	_____	0 - 2/1
Warrant Officers:	_____	W-3/4
	_____	W-1/2
Enlisted:	_____	E 8/9
	_____	E 7
	_____	E 5/6
	_____	E 3/4
	_____	E 1/2

Personnel Job Classifications

_____

_____ (list job classifications)

_____

3. If LSA Task 401 is not available, review the implications for training in the Baseline Comparison System (BCS) in conjunction with the operation and support tasks identified in other subtasks for the new system/equipment.

PROCESS 303.2.6.3A7 - Selected Trade-Off Areas

PURPOSE:

To select trade-off areas that consist of quantitative and qualitative data from the preceding five processes which impact on training requirements and therefore must be utilized in the Training Trade-Off Analysis.

PROCEDURE:

1. Review the results of Processes 303.2.6.3A2 through 303.2.6.3A6 and assess the areas which have been targeted for further sensitivity analysis or have been given a high priority for trade-off analysis.

2. Based on Hardware and Software Configuration Data, select those design areas which have the greatest impact on training requirements. Design aspects that are not well defined or have proven to be cost/readiness drivers of the Baseline system should be targeted for sensitivity analysis. Those areas of the design which appear to impose substantial new training requirements or course development should be selected for trade-off analysis.

3. Based on the Maintenance Concept, select the system component or maintenance function that requires high skill levels or significant amounts of training for further analysis. Where preliminary data is available, or the skill and function requirements have proven to be high cost drivers, a sensitivity analysis should be performed. Those tasks requiring large degrees of expertise or significant training requirements should be traded-off against design improvements, increased testability, or by making use of automatic diagnostic equipment.

4. Training concepts should be selected for further analysis when only preliminary data exists and the cost and effectiveness of the concept is unknown, or there are several alternatives being considered without a preferred alternative. Sensitivity Analysis should be performed on those concepts which have not been fully specified, while trade-off analysis should be done when several well-known alternatives are available.

TRADE-OFF AREAS WORKSHEET
(PROCESS 303.2.6.3A7)

NAME OF END ITEM: _____

NOMENCLATURE: _____

PART NUMBER: _____

PROCESS	TITLE	TRAINING IMPLICATIONS
303.2.6.3A2	Hdwe & Software Config	a. (e.g., requires new MDS) b. (e.g., requires special software courses)
303.2.6.3A3	Maintenance Concept	a. (e.g.,requires high mechanical aptitude) b. (e.g., requires basic electronic courses) c. etc.
303.2.6.3A4	Training Concepts	a. (e.g., indicates emphasis on OJT) b. (e.g., requires new school courses) c. etc.
303.2.6.3A5	Job Design	a. (e.g., requires emphasis on specialist trng) b. etc.
303.2.6.3A6	Manpower & Personnel	a. (e.g., new job classifications requiring special training courses) b. etc.

5. In selecting Job Design areas for further analysis, it is important to consider MOS specialties, special requirements, job descriptions, training/advancement, and availability of manpower. Each of these considerations will require trade-off analysis if there is more than one alternative being considered; if there is a high risk of not meeting the requirements using the selected MOS; or if the number of tasks performed by an individual is too great or very redundant, and there are very few individuals who meet the special requirements.

6. Manpower and Personnel considerations should be selected for further analysis when a new MOS is being created, or there is a shortage of manpower currently available to perform the task. A trade-off analysis must be conducted to determine if the operation and maintenance requirements can be met by modifying an existing MOS vs creating a new one. Additionally, a trade-off analysis should be conducted to look at methods of reducing the complexity of tasks in order to use available manpower in unconstrained MOS areas.

PROCESS 303.2.6.4 - DEVELOP ANALYTICAL TECHNIQUE

PURPOSE:

Development of usable analysis techniques for the Training Trade-Off Analysis will be dependent upon the phase of the materiel acquisition and the nature and thrust of expected results from that analysis. Tecnniques available for consideration include those used in Army Hardware Versus Manpower Comparability Analysis (HARDMAN), Training Effectiveness Analysis (TEA), and Manpower and Personnel Integration Continuous and Comprehensive Evaluation (MANPRINT C2E).

PROCESS 303.2.6.4A1 - Develop Potential Analysis Techniques

PURPOSE:

The development of potential analysis techniques for conducting a training trade-off analysis, including consideration of and selection from available and approved techniques noted in Processes 303.2.6.4A2 through 4A6. The technique developed will be determined by the results desired and the extent of input data available to conduct the analysis.

PROCEDURE:

1. Develop the Training Trade-Off Analysis technique which will provide results compatible with the phase of the materiel acquisition program during which the trade-off analysis is conducted. Desired results from each phase should be:

a. Pre-Concept and Concept Exploration: Establish training goals and constraints as inputs to the Integral Logistic Support Plan.

b. Demonstration and Validation: Refine training requirements and develop training impacts.

c. Full-Scale Development: Provide input to the Individual and Collective Training Plan (ICTP).

2. Analyze the techniques presented in Processes 303.2.6.4A2 through 303.2.6.4A4 below to develop an analytical technique to be used in the Training Trade-Off Analysis.

PROCESS 303.2.6.4A2 - Hardware vs. Manpower (HARDMAN)

PURPOSE:

To identify critical Manpower, Personnel and Training (MPT) requirements generated by an emerging system design by using the Hardware vs Manpower Comparability Analysis (HARDMAN) model. "HARDMAN is an analytical technique for early manpower, personnel, and training (MPT) estimation based on a technique which uses knowledge about similar existing systems and technological growth trends to project the MPT requirements of proposed systems".*

PROCEDURE:

1. Determine whether a requirement exists to perform an analysis if manpower requirements, projected training increases by MOS, and projected annual training cost data are available. If these data are not available from another source, it can be obtained using the HARDMAN analytical technique.

2. Obtain the HARDMAN Comparability Analysis Methodology Guide, Volumes I-V from the Defense Technical Information Center (DTIC).

*Boyner, Marilyn S., Catalog of MANPRINT Methodologies, MANPRINT Coordination Office, System Research Lab., Alexandria, VA, p.1-2

HARDMAN WORKSHEET
(PROCESS 303.2.6.4A2)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

System/Equipment Manpower by MOS*:

MOS	SKILL LEVEL	QUANTITY
XXXA	(e.g., E3/4)	XX
XXXB	(e.g., E5)	XX

* To support projected procurement.

Projected Training Increases by MOS:

	COURSE LENGTH		OJT TIME	
MOS	BCS	NEW ITEM	BCS	NEW ITEM
XXXA	(e.g., 5 wks)	(e.g., 6 wks)		
XXXB			(e.g., 10 wks)	(e.g., 8 wks)

Projected Annual Training Costs

	*ANNUAL TRAINING COSTS	
MOS	BCS	NEW ITEM
XXXA		
XXXB		

* Based on project procurement.

3. Gather the following types of data to use as Model inputs:

- Mission
- System development constraints/guidelines
- Usage rates
- Reliability and Maintainability (RAM) data
- Manpower Requirement Criteria data
- Transients, trainees, holdees, and student data
- Training data
- LSAR data.

4. Using the guides obtained from DTIC, perform the analysis.

5. Use results to determine the requirement for additional trade-off analysis in the areas of manpower requirements by MOS and skill levels, increased training requirements vs design changes, or new testing concepts, and alternatives to reducing training costs.

PROCESS 303.2.6.4A3 - Training Effectiveness Analysis (TEA)

PURPOSE:

Accumulate the TEA series of studies of hardware-oriented total systems to assess the impact of training on total system effectiveness and to insure development and implementation of cost-effective training subsystems.

NOTE: If a TEA has been accomplished, there may not be a requirement for the Training Trade-Off Analysis.

PROCEDURE:

1. Obtain a copy of a TEA if it has been accomplished for the system/equipment.

2. Extract any alternative training concepts that were recommended but that have not been incorporated into this analysis.

3. For the training alternatives, extract the following types of data and use them to complete any process for which this data can be used:

- Costs
- Manpower by MOS
- Aptitude level required
- Time available to train.

TRAINING EFFECTIVENESS ANALYSIS (TEA)
(PROCESS 303.2.6.4A3)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

RELATED INFORMATION

TEA TITLE:

DATE PREPARED:

PREPARED BY:

COMMAND/OFFICE SYMBOL:

VERSION:

PROCESS 303.2.6.4A4 - Manpower and Personnel Integration Continuous and Comprehensive Evaluation (MANPRINT C2E)

PURPOSE:

Identify training requirements related to critical or unique operation and maintenance tasks by utilizing the Handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems, 13 June 1986.

Review the handbook for Quantitative Analysis of MANPRINT Considerations in Army Systems, 13 June 1986 as guidance for accomplishing MANPRINT C2E. The results of MANPRINT C2E will be the identification of training requirements related to critical or unique operations and maintenance tasks derived for LSA Subtask 301.2.2.

PROCESS 303.2.6.5 - CONDUCT TRAINING TRADE-OFF ANALYSIS

PROCESS 303.2.6.5A1 - Establish Trade-Off Alternatives

PURPOSE:

To update, on an "as required" basis, the data developed in the process indicated in the procedure prior to the actual performance of the Trade-Off Analysis.

PROCEDURE:

1. Prior to initiation of the training Trade-Off Analysis, review and update, if necessary, results from the following processes:

a. 303.2.6.2A6, Selected Evaluation Criteria

b. 303.2.6.3A7, Selected Trade-Off Areas

c. 303.2.6.4A7, Developed Analysis Technique

PROCESS 303.2.6.5A2 - Conduct Training Trade-Off Analysis

PURPOSE:

The performance of the Training Trade-Off Analysis utilizing results of the preceding three processes for selected evaluation criteria, trade-off areas, and analytical techniques.

MANPOWER C2E WORKSHEET
(PROCESS 303.2.6.4A4)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

UNIQUE/CRITICAL OPN & MAINT TASK	TRAINING IMPACT
(e.g., computer maintenance)	(Additional Course)
(e.g., operating new tracked equipment)	(Lengthen OJT time)

TRAINING TRADE-OFF ANALYSIS
(303.2.6.5A2)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

RELATED INFORMATION

MODELING TECHNIQUE USED:

DOCUMENT TITLE:

DATE:

PREPARED BY:

COMMAND/OFFICE SYMBOL

VERSION:

PROCEDURE:

1. The actual Training Trade-Off Analysis is conducted using the foregoing processes as a background. The basic purpose of a training trade-off analysis is to maximize the results of training (i.e., readiness), while minimizing the training resources expended. The Training Trade-Off Analysis will follow a procedure similar to that described below:

a. Evaluation criteria will be applied to a training concept for the new equipment/system being studied. The criteria will be those listed on the Potential Training Evaluation Criteria Worksheet, Process 303.2.6.2A1.

(1) New training required to attain the availability objective will be evaluated. That evaluation will balance resources against costs. For example, the skill required to attain the Ao may be produced by a school course or OJT. The analysis must view that as a trade-off. Similarly, the length of a school course may be traded-off against the cost of a training device or simulator. In each of those examples, the analysis will show the relationship or trade-off between effectiveness and cost.

(2) An advance in technology may induce training reductions. The extent of that reduction may require new training devices or other methods. The cost of those new devices or methods must be traded-off with the value of the reduction in training time or resources.

(3) High support drivers must be reviewed to determine if different approaches may be traded off with each other. For example, OJT may be the most feasible approach to train low density skills; however, if the numbers of personnel are sufficiently large, establishment of a school course may be indicated.

b. The impact of design constraints considered in Process 303.2.6.2A2. The analysis which occurs under this process provides "feedback" to the equipment designers. The training trade-off which is made in relation to design may be used to influence designers. It may be shown that the inclusion of a design change or the addition of a certain feature may significantly reduce the training impact.

c. Support system training impacts studied under Process 303.2.6.2A3 may influence the system in a manner similar to design constraints. For example, a training trade-off may reveal that the use of solid state components rather than conventional mechanical systems may lead to a reduction in support requirements which, in turn, leads to a reduction in total training requirements. The trade-off here may be one of complexity (e.g., solid state) of the training versus the increased numbers of mechanics which may require training if conventional mechanical systems are employed.

d. Training system requirements analyzed in Process 303.2.6.2A4 provide a basis for a number of training trade-offs. The training approaches contained in various documents (O&O Plan, ROC, and SMMP) must be viewed as a basis for training trade-offs. The impact of training constraints (e.g., availability of unique facilities) may result in trade-offs. The use of simulators, devices, and embedded training should be considered in a trade-off.

e. Operation and maintenance task drivers analyzed in Process 303.2.6.A5 should enter the analysis in a manner similar to the foregoing items. The impact of unique functional requirements, particularly readiness, must be studied. Costs of the basic system versus training costs must be studied in a training trade-off. For example, an increase in basic system cost for embedded training should be traded-off in relation to continuing maintenance training costs.

f. A summary of the results of using evaluation criteria should be accomplished in accordance with Process 303.2.6.2A6.

2. Training trade-off topics will be analyzed using the results of Process 303.2.6.3. The areas to be considered in the trade-off are discussed below:

a. Hardware and software configurations are shown under Process 303.2.6.3A2. Training trade-offs in this area are similar to those accomplished for design considerations.

b. Training trade-offs related to maintenance concepts under Process 303.2.6.3A3 may be significant.

The areas to be considered are:

(1) The level of repair analysis might indicate that organizational level requirements may increase OJT requirements while intermediate and depot levels may require school training.

(2) Properly designed diagnostics should significantly reduce training requirements.

(3) The level at which maintenance functions are accomplished may increase OJT, schoolhouse training, or change the manpower required.

c. Training concepts under Process 303.2.6.3A4 enter the Training Trade-Off Analysis from the standpoints of manpower (how many?) and personnel (what type?).

d. Job design worksheets in Process 303.2.6.3A5 provide a data base for the accomplishment of the Training Trade-Off Analysis.

e. Manpower and personnel worksheets also provide a data base in Process 303.2.6.3A6.

f. Training trade-off areas are summarized in Process 303.2.6.3A7. Using the worksheet for that Process, the training trade-off may be accomplished. Various trade-off subjects may be indicated pertaining to OJT vs school training. Simulators and device requirements also enter the trade-off.

3. Training Trade-Off Analytic Techniques will be developed under Process 303.2.6.4. Analytic techniques discussed below could provide a basis for developing the analytic approach to a training trade-off analysis.

a. The analytic technique used in the HARDMAN methodology described above under Process 303.2.6.4A2 shows promise for accomplishing a training trade-off analysis. The basic analytic approach used in HARDMAN is an analysis of comparability. By its nature, a trade-off is a type of comparability analysis. The advantages/disadvantages of OJT are compared to school training to determine which approach produces trained personnel with the lowest expenditure of training resources.

The use of simulators in training is compared to the use of actual equipment to analyze effectiveness and cost.

The HARDMAN comparability analysis is therefore suggested as a valuable analytic technique in training trade-off analysis.

b. If a Training Effectiveness Analysis (TEA) has been performed (Process 303.2.6.4A3), a training trade-off analysis will most likely have been performed. If necessary, data from the TEA could be extracted and identified as a training trade-off analysis.

c. The MANPRINT C2E, Process 303.2.6.4A4, provides a methodology for examining the training of critical or unique operations and maintenance tasks. It could therefore be examined to provide a methodology for performing unique evaluations.

PROCESS 303.2.6.5A3 - Determine Trade-Off Analysis

PURPOSE:

To accumulate the results of a training trade-off analysis effort for possible integration, modification of existing training data or establishment of new training alternatives.

PROCEDURE:

1. The Training Trade-Off Analyses may provide the following:

a. Design modifications. If the trade-off is accomplished sufficiently early in the acquisition program, it may result in equipment/system design modifications. If it can be shown that a design change will make training more effective or will reduce the requirement for training resources, the design may be modified.

b. Personnel job designs. Training trade-off analyses may reveal that modifications to job designs designed for the BCS are warranted. Training analyses may reveal that skills required to perform two different operational or maintenance functions are sufficiently similar as to suggest a consolidation of what may have been separate job descriptions.

DETERMINING TRAINING REQUIREMENTS WORKSHEET
(PROCESS 303.2.6.5A3)

NEW ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Training Requirements Comparison

TRAINING REQUIREMENT	REQUIREMENTS	
	BCS TRAINING	NEW SYS. TRAINING
1. (e.g., Basic Nomenclature)	SCH HSE	SCH HSE
2. (e.g., Equipment Familiarization)	SCH CSE	SCH HSE
3. (e.g., Vehicle Operation)	ACTUAL EQUIP (OJT)	SIMULATOR (SCH HSE)
4. (e.g., Operator Maintenance)	ACTUAL EQUIP (OJT)	SIMULATOR (SCH HSE)
5. etc.		

c. Training requirements. Perhaps the most fruitful result of a training trade-off analysis occurs in the manner in which it identifies necessary training. An effective analysis should identify the type of training and provide indications of the potential training load resulting from the acquisition of new equipment or systems.

2. The training requirements for new equipment/systems determined in the Training Trade-Off Analysis could be summarized using the following approach:

a. Identify the training requirements for the BCS. These will vary depending on the equipment/system being studied.

b. Describe how the training requirements are best satisfied. For example, in the case of driver training, the requirement for training in the "rules of the road" may be satisfied with classroom procedures using lectures and films or other training aids. Actual training in driving would normally be accomplished with a practical exercise in driving the item being studied.

c. Similarly, the training requirements for the equipment/system could be analyzed and identified as in the case of the BCS. The satisfaction of those requirements should be shown.

d. Using a "side-by-side" comparison, the unique training requirements of the new equipment/system should be evident. If technological advances reduce the training requirement, they should be evident.

PROCESS 303.2.6.5A4 - Determine Impact of Results

PURPOSE:

To determine the impact of changes generated by the training trade-off analysis on existing training concepts, plans and capabilities.

PROCEDURE:

1. Evaluate results of the Training Trade-Off Analysis to determine their impact on the following:

a. Established training concepts and capabilities. This can be done by breaking a function into elements. The

TRAINING TRADE-OFF IMPACT WORKSHEET
(PROCESS 303.2.6.5A4)

NEW ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

Training Concepts Comparison

Concept	BCS	NEW ITEM
(e.g., Driver tng)	OJT	SIMULATOR
(e.g., Mechanic tng)	SCH CSE	SCH CSE & SIMULATOR

Training Capabilities Comparison (Inputs)

CAPABILITY	BCS	NEW ITEM
(OJT)	6 per company	8 per company
(school tng)	XXX/SCH/MO	YYY/SCH/MO

Manpower & Personnel Training Requirement

	BCS		NEW ITEM	
FUNCTION	NO.	MOS	NO.	MOS
(e.g., org maint)	XX/MO	XXXA	YY/MO	XXXB
(e.g., operator)	XX/MO	XXXC	YY/MO	XXXC

Costs Associated with Tng Devices

FUNCTION	Devices Costs	
	BCE	NEW ITEM
(e.g., Interm. Maint)	$3K/Device	$3.5K/Device

training system (e.g., OJT, schools, simulators) for the BCS should be identified. The change, if any, to support the new equipment/system can then be shown. Similarly changes in requirements to support the BCS could be compared to those for the new systems.

b. Changes in requirements for manpower and personnel between the BCS and the new system.

c. Costs associated with training devices for the BCS and the new equipment/system could be compared.

PROCESS 303.2.6.6 - Determine Optimum Training Solution

PURPOSE:

To distribute the Training Trade-Off Analysis results to the appropriate LSA tasks for further analysis and action.

PROCEDURE:

1. The optimum training solution will be the best balance between the new system/equipment design features and its support system. An optimum training solution results in operating and support personnel attaining and maintaining their required proficiency for successful job performance. Results should be provided from the Training Trade-Off Analysis as input to the following Logistic Support Analysis (LSA) tasks for possible follow-on trade-offs and evaluation:

a. LSA Task 205, Supportability and Supportability related design features, which may require quantitative and/or qualitative design features or constraints to satisfy training requirements.

b. LSA Task 302, Alternative System Support Plans, used to document how the system will be operated and maintained. Included as a part of the plan will be a description of training and training requirements for personnel at each maintenance level.

c. The training portion of support parameters to LSA Subtask 303.2.4, which evaluates the sensitivity of the new system/equipment readiness parameters to variations in design and support parameters, including personnel skills available.

d. Training mixes and job duties within job classifications to LSA Subtask 303.2.9, which provides a comparative evaluation between supportability, cost, and readiness parameters of the new system/equipment and identified existing comparative system/equipment.

e. LSA TTask 401, Task Analysis, which is conducted to identify new or critical logistic support resources including training devices, and LSA Subtask 401.2.4, which identifies the best mode of training between formal classroom, on-the-job training, or a combination of both.

f. LSA Task 501, Supportability Test and Evaluation, for preparation of test plans, the supportability assessment plan, and for coordination with user tests.

OPTIMUM TRAINING SOLUTION
(PROCESS 303.2.6.6)

END ITEM NAME: _____

NOMENCLATURE: _____

PART NUMBER: _____

RELATED INFORMATION

DOCUMENT TITLE:

DATE:

PREPARED BY:

COMMAND/OFFICE SYMBOL:

VERSION:

ANNEX D
—
VERT BATCH INPUT FILES FOR LSA SUBTASK 303.2.6

NOTE:

Our presentation of VERT methodology, naming conventions and default settings are reproduced verbatin in each report to facilitate the use of VERT batch input files, which are specifically designed to the given task or subtask.

VERT APPLICATION METHODOLOGY

BACKGROUND:

Venture Evaulation and Review Technique (VERT) was developed as a network analysis technique to facilitate management decision making. It allows a systematic planning and control of programs and enables managers to find solutions to real life managerial problems.

The terms of the APJ contract require the provision of batch files for each fo the VERT networks associated with the various Data Flow Diagrams in the APJ 966 projects.

APJ has been successful in adopting a method for the creation of these networks using the existing EXCELERATOR software package and establishing a naming convention compatible with that used in the Data Flow Diagrams. To do this APJ has made use of the PC model of VERT. A Structured Analysis project was used for this purpose. The prototype VERT network structure was made for one top level and one lower level data flow diagram.

The PC model of VERT has certain limitations built into it. To overcome some of thse limitations, certain conventions were used to create the input files. To maintain full generality a set of "dummy" default values were established. The model allows the user to alter the default values of time, cost, and performance to satisfy their specific requirements.

METHODOLOGY:

The basic symbols used to structure the network are:

(i) **SQUARES** - to indicate NODES. These are decision points in the project, or points beyond which the project cannot proceed unless certain criteria are met. There are two type of nodes, one which supports input operations and, the second type which supports output operations.

(ii) **LINES** - to indicate ARCS which are activities that have time, cost, and performance criteria associated with them.

In practice, however, both the arcs and nodes are similar, in that both have time, ocst, and performance criteria associated with them. The arcs have a primary and a cumulative set of time, cost, and performance criteria whereas the nodes have only a single cumulative set.

(iii) **NAMING CONVENTIONS** - Efforts have been made to keep the naming convention as compatible as possible to the Data Flow Diagrams. The naming convention used is displayed below.

NODES - All nodes are prefixed with the letter **N**. The individual Nodes are identified by a number and a letter. The number refers to the number of the node within the diagram and the letter refers to the diagram number in the project. In the event that a node has been referenced in an earlier diagram they also carry the number of the node in the earlier diagram as a prefix to the idividual node number.

N2.4A

N - All nodes are prefixed with the letter **N**
2 - Gives the number of the node it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to node **N2** of the top level diagram.
4 - Gives the number of the node it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to node **N2** of the top level diagram.
A - The nodes in each subsequent explosion are alloted an alphabetical suffix indication the number of the explosion diagram in the particular project. In this case it is the first lower level diagram within the project.

ARCS - All arcs are prefixed with either the letter C or **E**. The individual Arcs are identified by two numbers. The first number refers to the number of the arc within the diagram and the second number refers to the number of the diagram within thej project. In the event that an arc has been referenced in an earlier diagram they also carry the number of the arc in the earlier diagram as a prefix to the individual arc number. The arcs which are identified by the letter **E** have direct reference to a process in the corresponding data flow diagram and as usch are named the same as the process itself.

C - All arcs are prefixed with the letter C. In some cases, however, arcs carry a prefix of E. These particular arcs correspond to a process within the data flow diagram and are thus named the same as the process itself.

3.3- Gives the number of the arc it relates to in a higher level diagram or an earlier data flow diagram within the project. In this case it refers to arc number 3 in lower level diagram #3 within the project.

8.4- Indicates that this particular arc is the #8 arc in the #4 lowever level diagram of the project.

BATCH FILES

INPUT FILES - The input file names are given the extension ***.IN**.

OUTPUT FILES - The simulation output files are given the extension ***OU**.

PRINT FILES - The print files have been given the extension ***.PR**.

(This would allow subsequent updates of the input files to be numbered as **IN1...**, **OU1...**, **PR1...** etc.)

DEFAULT SETTINGS:

Control Record:

(i) The output option selected is "0" which provides a detailed listing, and high level of summary information.

(ii) The input record listing option selected is "0" which prints all input records.

(iii) The composite terminal node output option selected is "16" which assumes family mode and intrafamily transfer of histogram data.

(iv) The number of interations used are "10" in the demonstration model to facilitate operation in the debug mode if required.

(v) The composite node name and the network name are left as blanks.

(vi) In the run identification the name of the corresponding Data Flow Diagram is used as identification for the network description.

Arc Records:

(i) For each of the arcs the following records are provided:
(a) Master Arc Record
(b) Time Distribution Satellite
(c) Cost Distribution Satellite
(d) Performance Distribution Satelitte

(ii) The Distribution Satellite Records are created to provide a uniform statistical distribution.

(iii) The default values used for the minimum and maximum in each criteria are:

TIME	10.0	10.0
COST	10.0	100.0
PERFORMANCE	10.0	50.0

Node Records:

(i) Input Logic - The input logic for the nodes are either "**INITIAL**" or "**AND**".

(ii) Output Logic - The output logic has been defaulted to "**AND**" or "**TERMINAL**".

(iii) The output option indicator and the storage option indicator are defaulted to read "O".

(iv) The node description has also been left blank.

(It is again noted that the user can cange the default values to desired values as identified by the particular requirement and applications.)

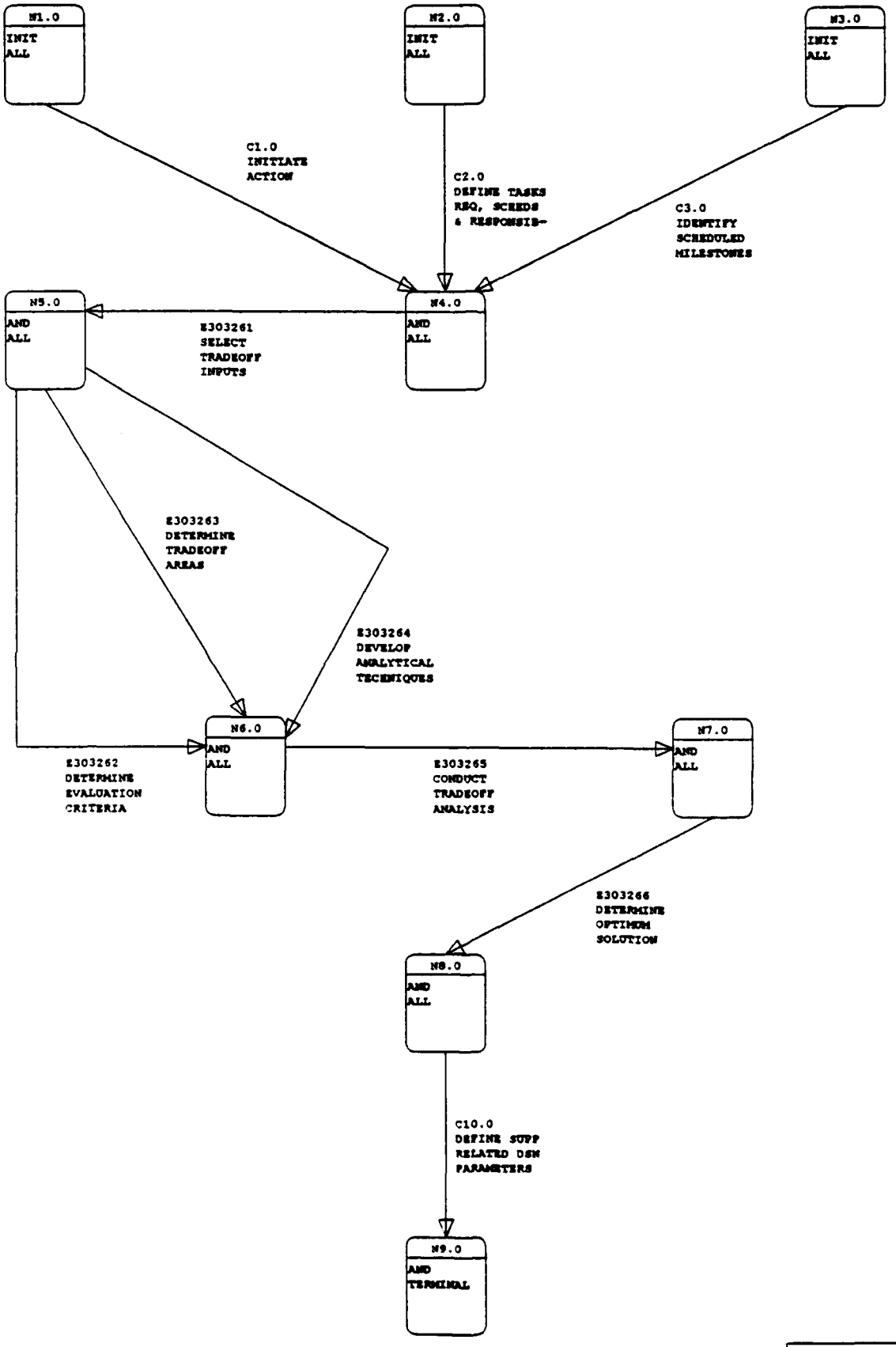
DOCUMENTATION:

With every project report APJ will be providing the following documents relating to the VERT:

(i) A VERt network diagram corresponding to a particular data flow diagram.

(ii) A print out of the VERT network inputs for the particular data flow diagrams.

(iii) A floppy disc containing the sample input, print and the simulation output files for the default VERT network.



303.2.6 TOP LEVEL VERT
Created by: CHAU
Revised by: CHAU
Date changed: 13-NOV-89

```
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                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123
    1. 0016  10                    TRADE-OFF TRAINING ALTERNATIVES
                   +         +         +         +         +         +         +
    2. C1.0     N1.0     N4.0      1.0 INITIATE ACTION
    3. C1.0     DTIME 1           2       10.0      20.0
    4. C1.0     DCOST 1           2       10.0     100.0
    5. C1.0     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
    6. C2.0     N2.0     N4.0      1.0 DEFINE TASKS REQUIREMNTS/SCHEDS/RESPONSIBIL
    7. C2.0     DTIME 1           2       10.0      20.0
    8. C2.0     DCOST 1           2       10.0     100.0
    9. C2.0     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   10. C3.0     N3.0     N4.0      1.0 IDENTIFY SCHEDULED MILESTONES
   11. C3.0     DTIME 1           2       10.0      20.0
   12. C3.0     DCOST 1           2       10.0     100.0
   13. C3.0     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   14. E303261  N4.0     N5.0      1.0 SELECT TRADE-OFF INPUTS
   15. E303261  DTIME 1           2       10.0      20.0
   16. E303261  DCOST 1           2       10.0     100.0
   17. E303261  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   18. E303262  N5.0     N6.0      1.0 DETERMINE EVALUATION CRITERIA
   19. E303262  DTIME 1           2       10.0      20.0
   20. E303262  DCOST 1           2       10.0     100.0
   21. E303262  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   22. E303263  N5.0     N6.0      1.0 DETERMINE TRADE-OFF AREAS
   23. E303263  DTIME 1           2       10.0      20.0
   24. E303263  DCOST 1           2       10.0     100.0
   25. E303263  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   26. E303264  N5.0     N6.0      1.0 DEVELOP ANALYTICAL TECHNIQUES
   27. E303264  DTIME 1           2       10.0      20.0
   28. E303264  DCOST 1           2       10.0     100.0
   29. E303264  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   30. E303265  N6.0     N7.0      1.0 CONDUCT TRADE-OFF ANALYSIS
   31. E303265  DTIME 1           2       10.0      20.0
   32. E303265  DCOST 1           2       10.0     100.0
   33. E303265  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   34. E303266  N7.0     N8.0      1.0 DETERMINE OPTIMUM SOLUTION
   35. E303266  DTIME 1           2       10.0      20.0
   36. E303266  DCOST 1           2       10.0     100.0
   37. E303266  DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   38. C10.0    N8.0     N9.0      1.0 DEFINE SUPPORTABILITY RELATED DESIGN PARAME
   39. C10.0    DTIME 1           2       10.0      20.0
   40. C10.0    DCOST 1           2       10.0     100.0
   41. C10.0    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   42. ENDARC
                   +         +         +         +         +         +         +
   43. N1.0     1  2 0 0
                   +         +         +         +         +         +         +
                   1         2         3         4         5         6         7
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1        N E W    N E T W O R K                    PAGE   2
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      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
   44. N4.0     2  2 0 0
                 +         +         +         +         +         +         +
   45. N2.0     1  2 0 0
                 +         +         +         +         +         +         +
   46. N3.0     1  2 0 0
                 +         +         +         +         +         +         +
   47. N5.0     2  2 0 0
                 +         +         +         +         +         +         +
   48. N6.0     2  2 0 0
                 +         +         +         +         +         +         +
   49. N7.0     2  2 0 0
                 +         +         +         +         +         +         +
   50. N8.0     2  2 0 0
                 +         +         +         +         +         +         +
   51. N9.0     2  1 0 0
                 +         +         +         +         +         +         +
   52. ENDNODE
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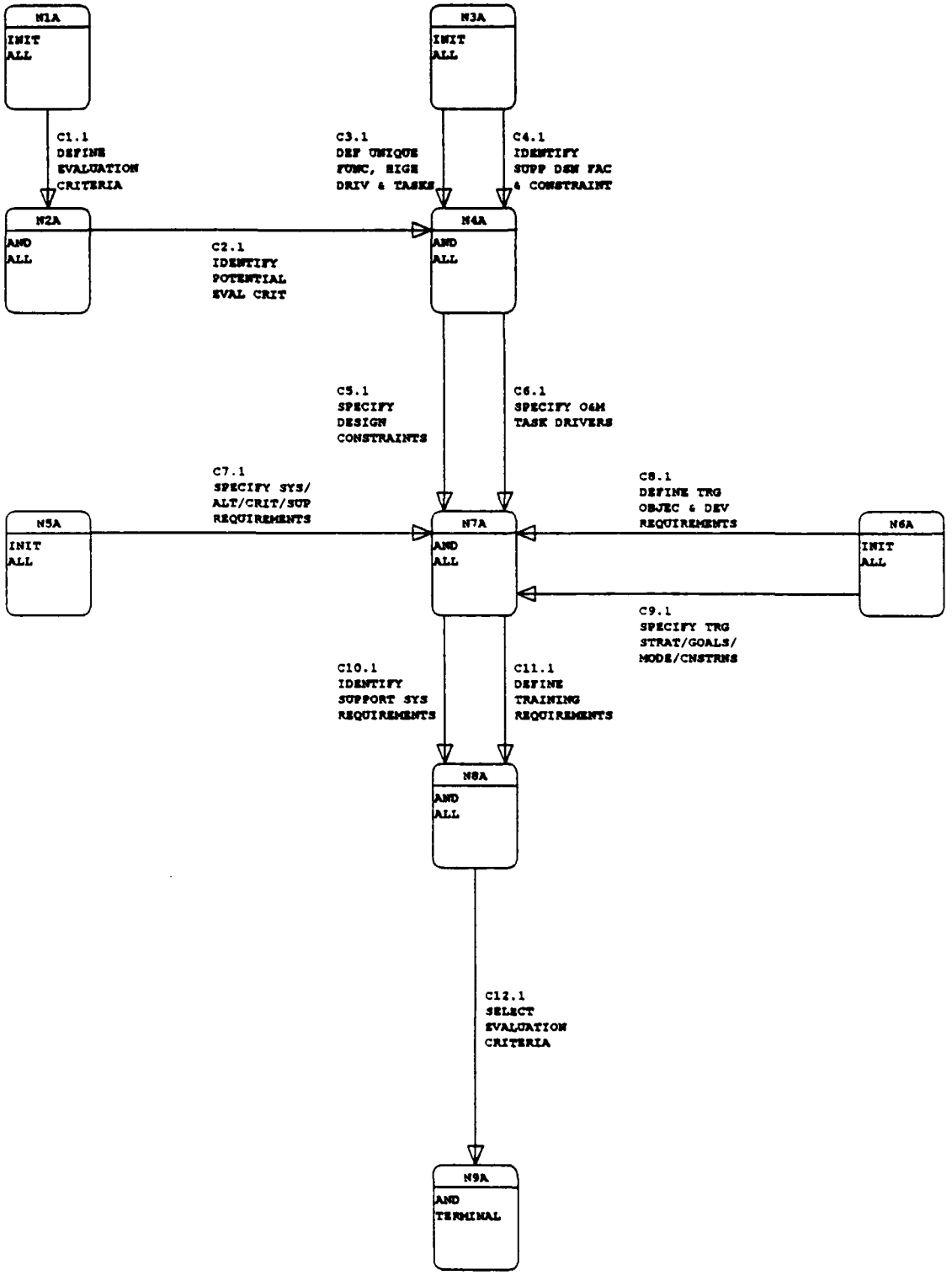

303.2.6.2A VERT
Created by: CHAU
Revised by: CHAU
Date changed: 10-NOV-89

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       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
    1. 0016  10                    EVALUATION CRITERIA
                   +         +         +         +         +         +         +
    2. C1.1     N1A      N2A       1.0 DEFINE EVALUATION CRITERIA
    3. C1.1     DTIME 1           2       10.0      20.0
    4. C1.1     DCOST 1           2       10.0     100.0
    5. C1.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
    6. C3.1     N3A      N4A       1.0 DEFINE UNIQUE FUNCTIONAL HIGH DRIVERS AND T
    7. C3.1     DTIME 1           2       10.0      20.0
    8. C3.1     DCOST 1           2       10.0     100.0
    9. C3.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   10. C4.1     N3A      N4A       1.0 IDENTIFY SUPPORTABILITY DSGN FACTORS & CONS
   11. C4.1     DTIME 1           2       10.0      20.0
   12. C4.1     DCOST 1           2       10.0     100.0
   13. C4.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   14. C2.1     N2A      N4A       1.0 IDENTIFY POTENTIAL EVALUATION CRITERIA
   15. C2.1     DTIME 1           2       10.0      20.0
   16. C2.1     DCOST 1           2       10.0     100.0
   17. C2.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   18. C5.1     N4A      N7A       1.0 SPECIFY DESIGN CONSTRAINTS
   19. C5.1     DTIME 1           2       10.0      20.0
   20. C5.1     DCOST 1           2       10.0     100.0
   21. C5.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   22. C6.1     N4A      N7A       1.0 SPECIFY OPERATION AND MAINTENANCE TASK DRIV
   23. C6.1     DTIME 1           2       10.0      20.0
   24. C6.1     DCOST 1           2       10.0     100.0
   25. C6.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   26. C7.1     N5A      N7A       1.0 SPECIFY SYSTEM/ALTERNATE/CRITICAL SUPPORT R
   27. C7.1     DTIME 1           2       10.0      20.0
   28. C7.1     DCOST 1           2       10.0     100.0
   29. C7.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   30. C8.1     N6A      N7A       1.0 DEFINE TRAINING OBJECTIVES & DEVELOPMENT RQ
   31. C8.1     DTIME 1           2       10.0      20.0
   32. C8.1     DCOST 1           2       10.0     100.0
   33. C8.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   34. C9.1     N6A      N7A       1.0 SPECIFY TRAINING STRATEGY/GOALS/MODE/CONSTR
   35. C9.1     DTIME 1           2       10.0      20.0
   36. C9.1     DCOST 1           2       10.0     100.0
   37. C9.1     DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   38. C10.1    N7A      N8A       1.0 IDENTIFY SUPPORT SYSTEMS REQUIREMENTS
   39. C10.1    DTIME 1           2       10.0      20.0
   40. C10.1    DCOST 1           2       10.0     100.0
   41. C10.1    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   42. C11.1    N7A      N8A       1.0 DEFINE TRAINING REQUIREMENTS
   43. C11.1    DTIME 1           2       10.0      20.0
   44. C11.1    DCOST 1           2       10.0     100.0
   45. C11.1    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
```

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                1         2         3         4         5         6         7
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1         N E W    N E T W O R K                    PAGE   2
                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
    46. C12.1   N8A      N9A       1.0 SELECT EVALUATION CRITERIA
    47. C12.1   DTIME 1           2       10.0       20.0
    48. C12.1   DCOST 1           2       10.0      100.0
    49. C12.1   DPERF 1           2       10.0       50.0
                 +         +         +         +         +         +         +
    50. ENDARC
                 +         +         +         +         +         +         +
    51. N1A     1  2 0 0
                 +         +         +         +         +         +         +
    52. N2A     2  2 0 0
                 +         +         +         +         +         +         +
    53. N4A     2  2 0 0
                 +         +         +         +         +         +         +
    54. N3A     1  2 0 0
                 +         +         +         +         +         +         +
    55. N7A     2  2 0 0
                 +         +         +         +         +         +         +
    56. N5A     1  2 0 0
                 +         +         +         +         +         +         +
    57. N6A     1  2 0 0
                 +         +         +         +         +         +         +
    58. N8A     2  2 0 0
                 +         +         +         +         +         +         +
    59. N9A     2  1 0 0
                 +         +         +         +         +         +         +
    60. ENDNODE
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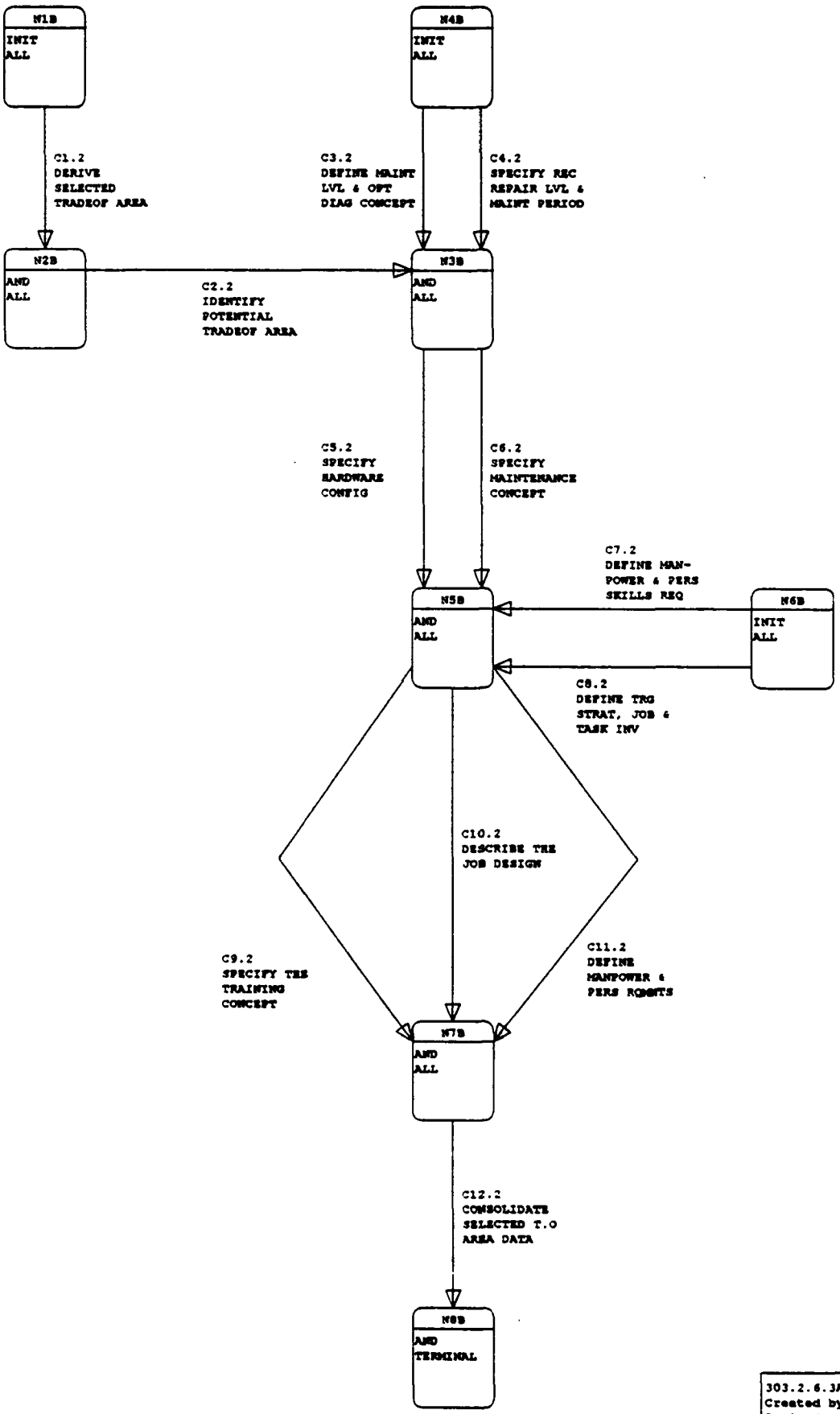

303.2.6.3A VERT
Created by: CHAU
Revised by: CHAU
Date changed: 13-NOV-89

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                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
    1. 0016  10                    TRADE-OFF AREAS
                   +         +         +         +         +         +         +
    2. C1.2    N1B      N2B       1.0 DERIVE SELECTED TRADE-OFF AREAS
    3. C1.2    DTIME 1           2       10.0      20.0
    4. C1.2    DCOST 1           2       10.0     100.0
    5. C1.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
    6. C3.2    N4B      N3B       1.0 DEFINE MAINT. MODE & OPTIMIZATION  DIAGNOST
    7. C3.2    DTIME 1           2       10.0      20.0
    8. C3.2    DCOST 1           2       10.0     100.0
    9. C3.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   10. C4.2    N4B      N3B       1.0 SPECIFY RECOMM'D REPAIR LEVELS & MAINTENANC
   11. C4.2    DTIME 1           2       10.0      20.0
   12. C4.2    DCOST 1           2       10.0     100.0
   13. C4.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   14. C2.2    N2B      N3B       1.0 IDENTIFY POTENTIAL TRADE-OFF AREAS
   15. C2.2    DTIME 1           2       10.0      20.0
   16. C2.2    DCOST 1           2       10.0     100.0
   17. C2.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   18. C5.2    N3B      N5B       1.0 SPECIFY HARDWARE CONFIGURATION
   19. C5.2    DTIME 1           2       10.0      20.0
   20. C5.2    DCOST 1           2       10.0     100.0
   21. C5.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   22. C6.2    N3B      N5B       1.0 SPECIFY MAINTENANCE CONCEPTS
   23. C6.2    DTIME 1           2       10.0      20.0
   24. C6.2    DCOST 1           2       10.0     100.0
   25. C6.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   26. C7.2    N6B      N5B       1.0 DEFINE MANPOWER/PERSONNEL SKILLS REQUIREMEN
   27. C7.2    DTIME 1           2       10.0      20.0
   28. C7.2    DCOST 1           2       10.0     100.0
   29. C7.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   30. C8.2    N6B      N5B       1.0 DEFINE TRAINING/STRATEGY/JOB/TASK INVENTORI
   31. C8.2    DTIME 1           2       10.0      20.0
   32. C8.2    DCOST 1           2       10.0     100.0
   33. C8.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   34. C9.2    N5B      N7B       1.0 SPECIFY TRAINING CONCEPTS
   35. C9.2    DTIME 1           2       10.0      20.0
   36. C9.2    DCOST 1           2       10.0     100.0
   37. C9.2    DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   38. C10.2   N5B      N7B       1.0 DESCRIBE THE JOB DESIGN
   39. C10.2   DTIME 1           2       10.0      20.0
   40. C10.2   DCOST 1           2       10.0     100.0
   41. C10.2   DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
   42. C11.2   N5B      N7B       1.0 DEFINE MANPOWER/PERSONNEL REQUIREMENTS
   43. C11.2   DTIME 1           2       10.0      20.0
   44. C11.2   DCOST 1           2       10.0     100.0
   45. C11.2   DPERF 1           2       10.0      50.0
                   +         +         +         +         +         +         +
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1         N E W    N E T W O R K                    PAGE   2
                1         2         3         4         5         6         7
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    46. C12.2   N7B     N8B      1.0 CONSOLIDATE SELECTED TRADE-OFF AREA DATA
    47. C12.2   DTIME 1          2       10.0      20.0
    48. C12.2   DCOST 1          2       10.0     100.0
    49. C12.2   DPERF 1          2       10.0      50.0
                 +         +         +         +         +         +         +
    50. ENDARC
                 +         +         +         +         +         +         +
    51. N1B     1  2 0 0
                 +         +         +         +         +         +         +
    52. N2B     2  2 0 0
                 +         +         +         +         +         +         +
    53. N4B     1  2 0 0
                 +         +         +         +         +         +         +
    54. N3B     2  2 0 0
                 +         +         +         +         +         +         +
    55. N5B     2  2 0 0
                 +         +         +         +         +         +         +
    56. N6.B    1  2 0 0
                 +         +         +         +         +         +         +
    57. N6B     1  2 0 0
                 +         +         +         +         +         +         +
    58. N7B     2  2 0 0
                 +         +         +         +         +         +         +
    59. N8B     2  1 0 0
                 +         +         +         +         +         +         +
    60. ENDNODE
                1         2         3         4         5         6         7
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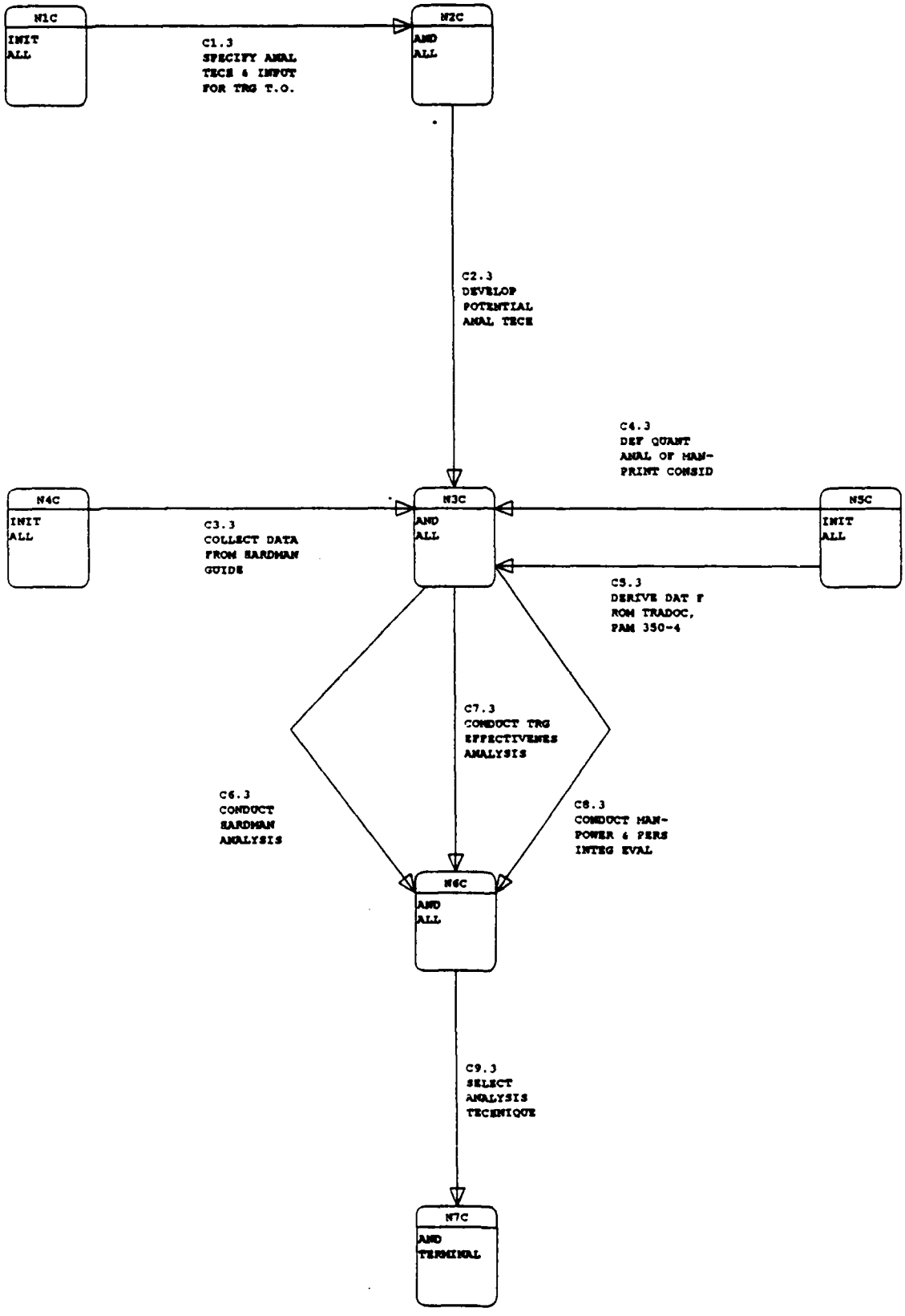

303.2.6.4A VERT
Created by: CEAU
Revised by: CEAU
Date changed: 10-NOV-99

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    1. 0016  10                    ANALYTICAL TECHNIQUES
                +         +         +         +         +         +         +
    2. C1.3     N1C       N2C        1.0 SPECIFY ANALIT'L TECHNIQ. & INPUT FOR TRNG
    3. C1.3     DTIME 1             2        10.0        20.0
    4. C1.3     DCOST 1             2        10.0       100.0
    5. C1.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
    6. C2.3     N2C       N3C        1.0 DEVELOP POTENTIAL ANALYTICAL TECHNIQUES
    7. C2.3     DTIME 1             2        10.0        20.0
    8. C2.3     DCOST 1             2        10.0       100.0
    9. C2.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   10. C3.3     N4C       N3C        1.0 COLLECT DATA FROM HARDMAN GUIDE
   11. C3.3     DTIME 1             2        10.0        20.0
   12. C3.3     DCOST 1             2        10.0       100.0
   13. C3.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   14. C4.3     N5C       N3C        1.0 DEFINE QUANTITATIVE ANALYSIS OF MANPRINT CO
   15. C4.3     DTIME 1             2        10.0        20.0
   16. C4.3     DCOST 1             2        10.0       100.0
   17. C4.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   18. C5.3     N5C       N3C        1.0 DERIVE DATA FROM TRADOC PAM 350-4
   19. C5.3     DTIME 1             2        10.0        20.0
   20. C5.3     DCOST 1             2        10.0       100.0
   21. C5.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   22. C6.3     N3C       N6C        1.0 CONDUCT HARDMAN ANALYSIS
   23. C6.3     DTIME 1             2        10.0        20.0
   24. C6.3     DCOST 1             2        10.0       100.0
   25. C6.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   26. C7.3     N3C       N6C        1.0 CONDUCT TRAINING EFFECTIVENESS ANALYSIS
   27. C7.3     DTIME 1             2        10.0        20.0
   28. C7.3     DCOST 1             2        10.0       100.0
   29. C7.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   30. C8.3     N3C       N6C        1.0 CONDUCT MANPOWER/PERSONNEL INTEGRITY EVALUA
   31. C8.3     DTIME 1             2        10.0        20.0
   32. C8.3     DCOST 1             2        10.0       100.0
   33. C8.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   34. C9.3     N6C       N7C        1.0 SELECT ANALYSIS TECHNIQUE
   35. C9.3     DTIME 1             2        10.0        20.0
   36. C9.3     DCOST 1             2        10.0       100.0
   37. C9.3     DPERF 1             2        10.0        50.0
                +         +         +         +         +         +         +
   38. ENDARC
                +         +         +         +         +         +         +
   39. N1C      1  2 0 0
                +         +         +         +         +         +         +
   40. N2C      2  2 0 0
                +         +         +         +         +         +         +
   41. N3C      2  2 0 0
                +         +         +         +         +         +         +
   42. N4C      1  2 0 0
                +         +         +         +         +         +         +
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1         N E W    N E T W O R K                    PAGE   2
                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
   43. N5C      1  2 0 0
                 +         +         +         +         +         +         +
   44. N6C      2  2 0 0
                 +         +         +         +         +         +         +
   45. N7C      2  1 0 0
                 +         +         +         +         +         +         +
   46. ENDNODE
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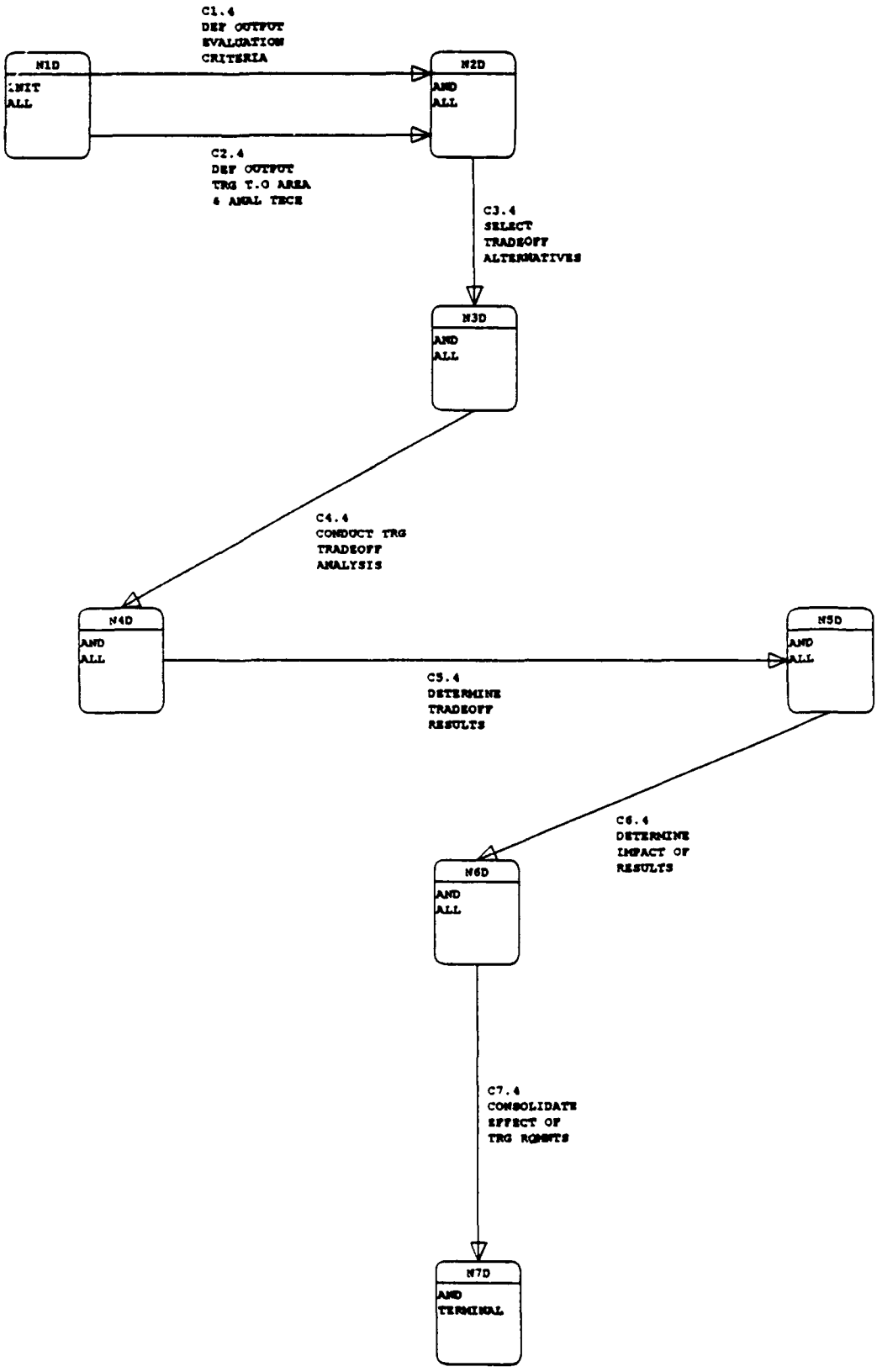

303.2.6.5A VERT
Created by: CHAU
Revised by: CHAU
Date changed: 10-NOV-89

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    1. 0016  10                    CONDUCT TRADE-OFF ANALYSIS
                +         +         +         +         +         +         +
    2. C1.4     N1D       N2D        1.0 DEFINE OUTPUT EVALUATION CRITERIA
    3. C1.4     DTIME 1             2       10.0       20.0
    4. C1.4     DCOST 1             2       10.0      100.0
    5. C1.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
    6. C2.4     N1D       N2D        1.0 DEFINE OUTPUT TRNG TRADE-OFF AREA & ANAL. T
    7. C2.4     DTIME 1             2       10.0       20.0
    8. C2.4     DCOST 1             2       10.0      100.0
    9. C2.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   10. C3.4     N2D       N3D        1.0 SELECT TRADE-OFF ALTERNATIVES
   11. C3.4     DTIME 1             2       10.0       20.0
   12. C3.4     DCOST 1             2       10.0      100.0
   13. C3.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   14. C4.4     N3D       N4D        1.0 CONDUCT TRAINING TRADE-OFF ANALYSIS
   15. C4.4     DTIME 1             2       10.0       20.0
   16. C4.4     DCOST 1             2       10.0      100.0
   17. C4.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   18. C5.4     N4D       N5D        1.0 DETERMINE TRADE-OFF RESULTS
   19. C5.4     DTIME 1             2       10.0       20.0
   20. C5.4     DCOST 1             2       10.0      100.0
   21. C5.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   22. C6.4     N5D       N6D        1.0 DETERMINE IMPACT OF RESULTS
   23. C6.4     DTIME 1             2       10.0       20.0
   24. C6.4     DCOST 1             2       10.0      100.0
   25. C6.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   26. C7.4     N6D       N7D        1.0 CONSOLIDATE EFFECT OF TRAINING REQUIREMENTS
   27. C7.4     DTIME 1             2       10.0       20.0
   28. C7.4     DCOST 1             2       10.0      100.0
   29. C7.4     DPERF 1             2       10.0       50.0
                +         +         +         +         +         +         +
   30. ENDARC
                +         +         +         +         +         +         +
   31. N1D      1  2 0 0
                +         +         +         +         +         +         +
   32. N2D      2  2 0 0
                +         +         +         +         +         +         +
   33. N3D      2  2 0 0
                +         +         +         +         +         +         +
   34. N4D      2  2 0 0
                +         +         +         +         +         +         +
   35. N5D      2  2 0 0
                +         +         +         +         +         +         +
   36. N6D      2  2 0 0
                +         +         +         +         +         +         +
   37. N7D      2  1 0 0
                +         +         +         +         +         +         +
   38. ENDNODE
                1         2         3         4         5         6         7
       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
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ANNEX E

STRUCTURED SYSTEMS ANALYSIS

—

FUNDAMENTALS

ANNEX E
STRUCTURED SYSTEMS ANALYSIS

Fundamentals

Structured Systems Analysis (SSA) has recently become an industry standard for generating Data Flow Diagrams (replacing "logic diagrams" or "flow charts") to aid in coordinating the functions to be performed by a computer program and its associated Inputs/Outputs (I/O). During the SSA, each set of "flow charts" can be checked by the potential user to assure that there is complete agreement on what is to be done by the program, and how it is to be accomplished. It also provides considerable flexibility for updating or changing the program.

Six basic elements (see Figure 1) are used in SSA:

1. Process (PRC)
2. Data Flow (DAF)
3. Data Store (DAS)
4. External Entity (EXT)
5. Data Flow Diagram (DFD)
6. Data Dictionary (DCT)

PROCESS (Represented by a Circle):

A function or operation to be performed which can be explained by a set of instructions representing a single task, e.g., "calculate interest on a loan", "prepare a draft report". If the Process description is too complex to describe in a few steps, it may be necessary to develop a lower level description (see below).

DATA FLOW (Lines interconnecting Processes or I/Os):

Each function or Process cannot be a stand-alone in a complex network. To have any meaning in a program, each process must be initiated by a previous action and/or provided information on which to act. Furthermore, a Process must result in an output which is the input to the next logical Process. These inputs, outputs, or initiating actions are identified as Data Flows, and are represented by the Data Flow lines indicating its point of origin and the process to which it provides data.

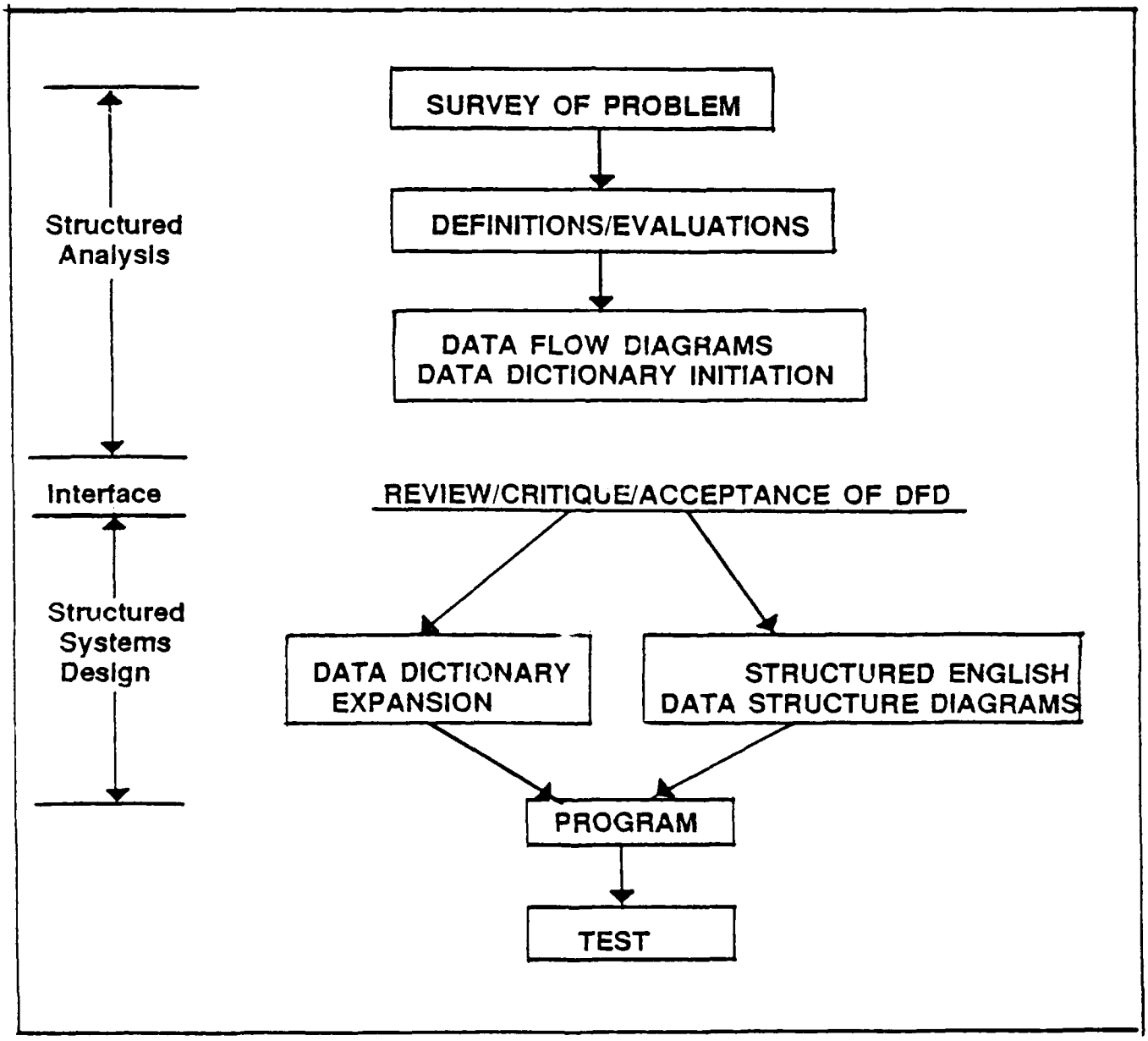

Figure 1. Structured Analysis & Structured Systems Design Organization

DATA STORE (Represented by two parallel lines):

Although some Processes generate data used as input to a succeeding Process, there is often a need to "gather or collect" information from files in which it is stored. This information may come from an external source (such as a MIL-STD, Army regulation, historical experience files, etc.), or an internal source or file in which data is temporarily stored for use by succeeding processes. These Data Stores can be visualized as a "file cabinet", in which the data are stored for later retrieval).

EXTERNAL ENTITY (Represented by a Rectangle):

Each program or logical process must have an initiating action, a "point" of disposition of the results, and possible input guidance or instructions. Each of these have authorities, functions, or applications which are independent of the program Process (although required by the program Process). Thus, these activities, agencies, or facilities are considered "External Entities" to the program.

DATA FLOW DIAGRAM:

The general arrangement of the above can be readily seen. First, the circle or Process describes what has to be done; the interconnecting lines represent the Data Flows, together with the specific description of all I/Os. The Data Stores identify the source and/or file designation of a data base, and the External Entities represent those activities remote from the Process, which are the source of guidance or the recipients of the program. This combination of Processes, Data Flows, Data Stores, and External Entities constitutes a "Data Flow Diagram". The unique feature of the Data Flow Diagram (DFD) is that each process can be considered independently, permitting a change to be made in one Process without a major change in the overall program.

DATA DICTIONARY:

The Data Dictionary consists of a complete description of each of the basic elements. For the Process, it contains a step-by-step description of what has to be performed. The description of the Data Flow identifies the nomenclature of the data, a detailed description of its content, and its source. The Data Stores and External Entities are described, including possible location.

The Data Dictionary (a living document) begins with a description of the first Process and is continually built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

APPROACH TO PERFORMING STRUCTURED SYSTEM ANALYSIS:

The best approach to Structured Systems Analysis is to assume that the program consists of a series of processes, each of which are to be assigned to an inexperienced analyst. Each analyst is to be walked through the assigned process of the Program, explaining step-by-stepwhat functions have to be performed or what actions have to be taken to accomplish the process. The analyst is also informed where the information is coming from (input Data Flow), what is to be generated by each process (output Data Flow), where the data base may to be found (Data Stores), and who to contact for guidance (External Entities).

The best way to initiate a SSA is to set down the point of origin of a program, its final goal(s), and the intermediate functions or actions needed to get from beginning to goal. Each step should be considered as a Process - some may be sequential and others parallel. Then, the steps needed to accomplish the Process should be described. If the description is complex and needs intermediate steps, the Process is then a candidate for an "explosion". That is, the top (or upper) level Process is considered as a "project" and its own Data Flow Diagram is prepared.

When writing the step-by-step procedures in the Process, certain elements of data (or information) must be made available for the procedure. Each element of data is considered as an input Data Flow, which is identified and described. The product (or result) of a Process is an output Data Flow element.

Each Data Flow to the Process must originate from:

1. an earlier Process
2. a Data Store (or file)
3. an External Entity.

These sources are also identified, described and put into the Data Dictionary. As soon as the last portion of the Data Flow Diagram has been described, the SSA is complete.

The structured Analysis phase is followed by Structured Design, then by programming and finally software test and validation. The organization of Structured Analysis and its relationship to Structured System Design is shown on Figure 2.

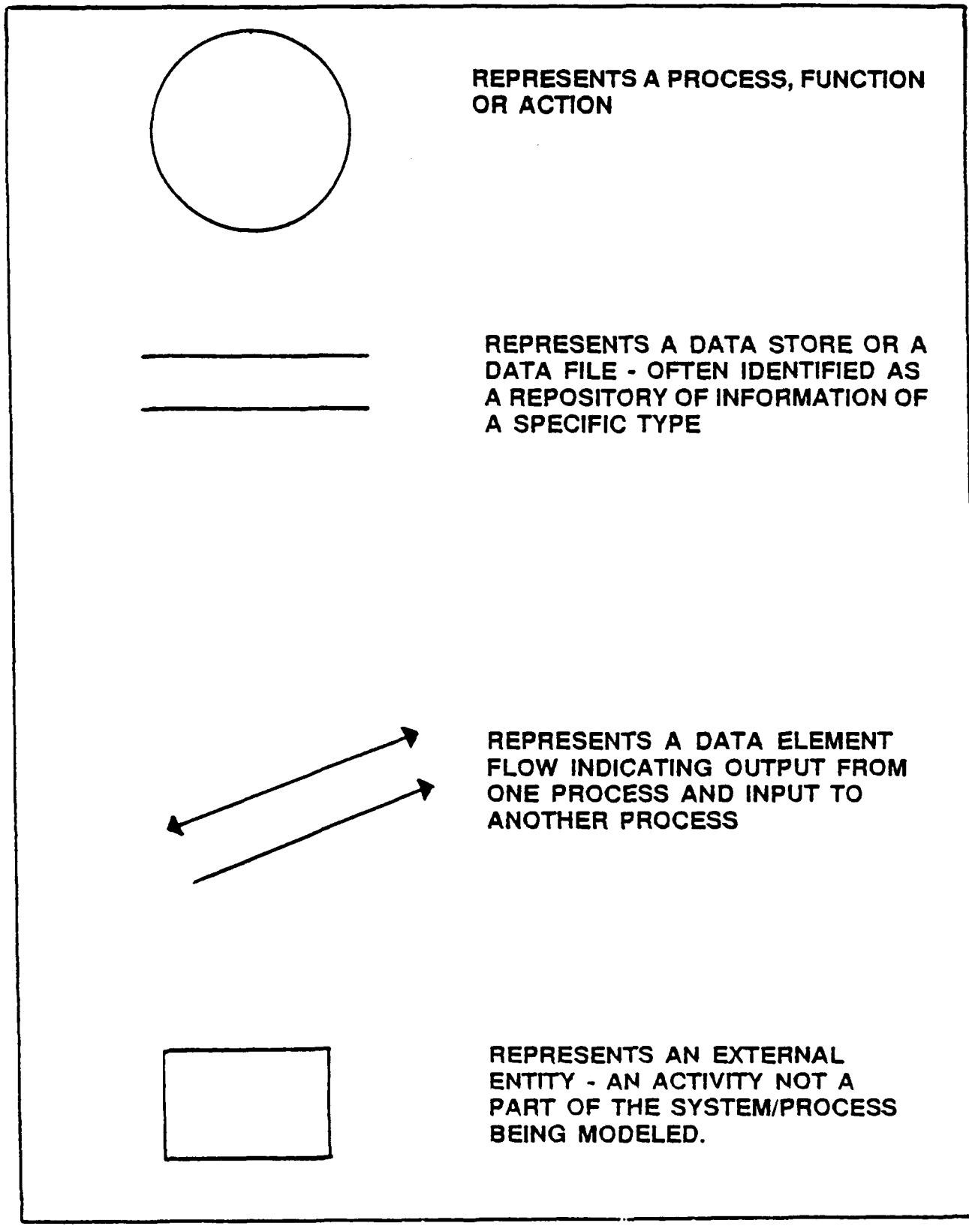

Figure 2. Standard DFD Symbol Definitions

GLOSSARY

AMSDL	Acquisition Management Systems and Data Requirements Control List
APJ	American Power Jet Company
AR	Army Regulation
DFD	Data Flow Diagram
DID	Data Item Description
FMECA	Failure Mode, Effects, and Criticality Analysis
ILS	Integrated Logistic Support
LSA	Logistic Support Analysis
LSAR	Logistic Support Analysis Report
PAM	Pamphlet
MIL-STD	Military Standard
RCM	Reliability Centered Maintenance
SSAD	Structured Systems Analysis and Design